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NTEM Planning Data Version 6.2 Guidance Note

Department for Transport

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1.1 OVERVIEW

1.1.1 This introduction provides an overview of the processes, methodology and data sources used to produce the NTEM 6.2 planning data set.

1.1.2 Section 2 describes the methodology used to convert the input assumptions into coherent planning data forecasts. This methodology is implemented in a bespoke software tool, the Scenario Generator, which was redesigned for version 5 and remains virtually unchanged for version 6.2. This section traces logically through the forecasting process, attempting to explain the more complex issues diagrammatically. The mathematical specification of this process is provided in Appendix E.

1.1.3 Section 3 describes the data sources used in the derivation of 2001 base year inputs. These include population, households, dwellings and employment, segmented into the required dimensions.

1.1.4 Section 4 describes the forecast data requirements needed by the Scenario Generator. This covers use of trend-based population, household and employment figures. The production of a policy-based data set for dwellings and the consultation process is also described in this section.

1.1.5 Section 5 describes the derivation of Expected Growth Factors used within the forecasting process. This includes a brief methodological overview and worked examples.

1.1.6 Section 6 summarises some of the initial results output from the forecasting process that represent the initial set of forecast planning data, to be subjected to further consultation with the Regional Planning Bodies.

1.2 SUMMARY OF CHANGES FOR NTEM 6.2

1.2.1 The following elements have been enhanced for NTEM 6.2 (compared with the earlier NTEM 5.4 dataset):

- Policy-based input dwelling assumptions through time for all Great Britain based initially on consultation with Regional Planning Bodies, and more recently based on Local Authorities published housing trajectories.
- The data sources have been updated. NTEM 6.2 uses 2008 based population projections and the 2008 based household projections; dwellings data for England, Wales and Scotland reflect the latest Local Authority plans; and the employment forecast data reflects the effect of the recent recession, using the latest employment forecasts available from the Office for Budget Responsibility and HM Treasury. The car ownership forecasts have also been updated with the most recent GDP forecasts, and also to take into account the decline in car purchasing costs in real terms between 2001 and 2009.
- The employment forecasting method has been updated.

1.2.2 The following elements have been retained for NTEM 6.2 (compared with the earlier NTEM 5.4 dataset):

- 2001 Census Output Area based NTEM zone geography, with 2,496 zones nested within local authority districts.

- Input planning data set to a 2001 base, primarily making use of the 2001 Census of Population
- Revised approach for the allocation of population and households to zones
- Choice of using weight or trend based growth factoring method in the Scenario Generator to produce zonal estimates of population and employment.
- Greater segmentation of population data (eg two working age groups, greater segmentation of elderly age group)
- Flexibility to allow changing definitions of Control Areas and Study Areas in the Scenario Generator
- Internal adjustment of workforce demand based on supply of available population

1.2.3 The employment data forecasts for NTEM V6.2 are slightly lower than those adopted for the V5.4 dataset. This results in fewer commuting and business trips in v6.2 compared with v5.4, though the impact on overall travel demand is small.

1.2.4 A number of features of NTEM 6.2 are now discussed in more detail.

GEOGRAPHY

1.2.5 The main spatial unit in NTEM, the NTEM zone, was completely revised for version 5 of its release. These are now based on 2001 Census Output Areas (2003 based geography) to give a good representation of urbanicity and rurality at a refined level of geographical detail. There are 2,496 NTEM zones in Great Britain.

1.2.6 The country has been divided into nine “study areas” to represent each Region of the country. London, the South East and East of England Regions are combined into a single study area. Intermediate between the zones and the study areas are a set of control areas to which forecasts are constrained based on administrative boundaries. The concept of a “balancing area” is retained within which workers at the residence and workplace end are balanced. The definitions are updated to be compatible with the revised NTEM zones.

1.2.7 See Appendix A for a map of the new NTEM zones overlaid on defined study areas and the set of balancing areas used.

UPDATE TO 2001 BASE YEAR

1.2.8 A major pre-processing step in the production of the NTEM planning data for version 5 was the update to the 2001 base year. This involved extensive use of the 2001 Census of Population. This allowed a considerable level of detail where data may be obtained at the Output Area level. Indeed, the new NTEM zoning system was designed to allow for this capability.

1.2.9 Since the construction of NTEM 5.4, new data sources have come to light which suggest that the distribution of jobs by Region, and the total workers, in 2001 may have been slightly different to that used in NTEM 5.4. The 2001 planning data has been updated accordingly.

1.2.10 Generation of the 2001 base data is described in detail in Section 3 of this guidance note.

POLICY-BASED DWELLING INPUTS

1.2.11 NTEM 6.2 is based on policy-based forecasts of dwellings in future years. For NTEM 5.4 the policy-based approach originally involved consultation with each of the eleven Regional Planning Bodies in Great Britain, which cover Wales, Scotland and the Government Office Regions in England. More recently this approach has been revised to use the local authorities' latest projections, taken from their Annual Monitoring Reports. It is intended that this will produce future year planning forecast based on expected realistic development plans. These will hence be of more value when analysing future patterns of land use and transport.

1.2.12 The primary policy-based element of the data is in the dwelling forecasts. Input household and population data remains primarily trend-based, although the forecasts are adjusted by the Scenario Generator for consistency with the policy based dwellings forecasts. This approach may potentially be adjusted where further consultation or guidance provides a more realistic insight.

ALLOCATION OF POPULATION AND HOUSEHOLDS

1.2.13 A revised approach is implemented for the allocation of population and household projections to take account of the availability of dwelling space. Where household capacity does not meet demand in a specific control area (district), households will attempt to move to other control areas within the study area (ie Region). Where spare capacity is not available in the study area overall, household formation rates are reduced with an implied increase in household size. The level of household formation may be specified. This affects the propensity for households to relocate to different areas or for input projections to be reduced.

DIFFERENTIAL GROWTH RATES

1.2.14 Differential growth or decline in employment by sector alters employment rates for population groups. If the maximum employment rate is reached for any population group, the gender and then the working status profile of the workforce demanded (ie full time or part time) is adjusted. For example, if the supply of male full time workers is exceeded by the demand in a specific area, female full time workers may take their place as long as the growth in female full time workers allows. This is part of the balancing of workforce and workers process, where everything is controlled to balancing area totals.

1.2.15 When applying growth factors to derive households or employment by zone in the forecasting process, the enhanced Scenario Generator allows the use of growth factors based on "weights" or "trends". In both cases the growth factors are used to scale the previous amount of activity in a zone. This process will over or underestimate the required change in activity for the study area (Region) as a whole. The subsequent adjustment made to the growth factors to get the required total in the two approaches differs. When using weights the growth factors are adjusted proportionally, while trends based growth factors are adjusted additively. This allows a greater degree of sophistication in applying growth and caters for situations where a mixture of growth and decline is forecast within the same control area. This is covered in more detail in Section 5.

1.3 OUTLINE OF NTEM FORECASTING PROCESS

1.3.1 The complete process involved in the production of NTEM forecasts can be seen in Figure 1.1. The process of creating forecast year planning data that concerns the core of this note involves running through the Scenario Generator that creates planning data forecasts for input into the National Car Ownership and National Trip End Models.

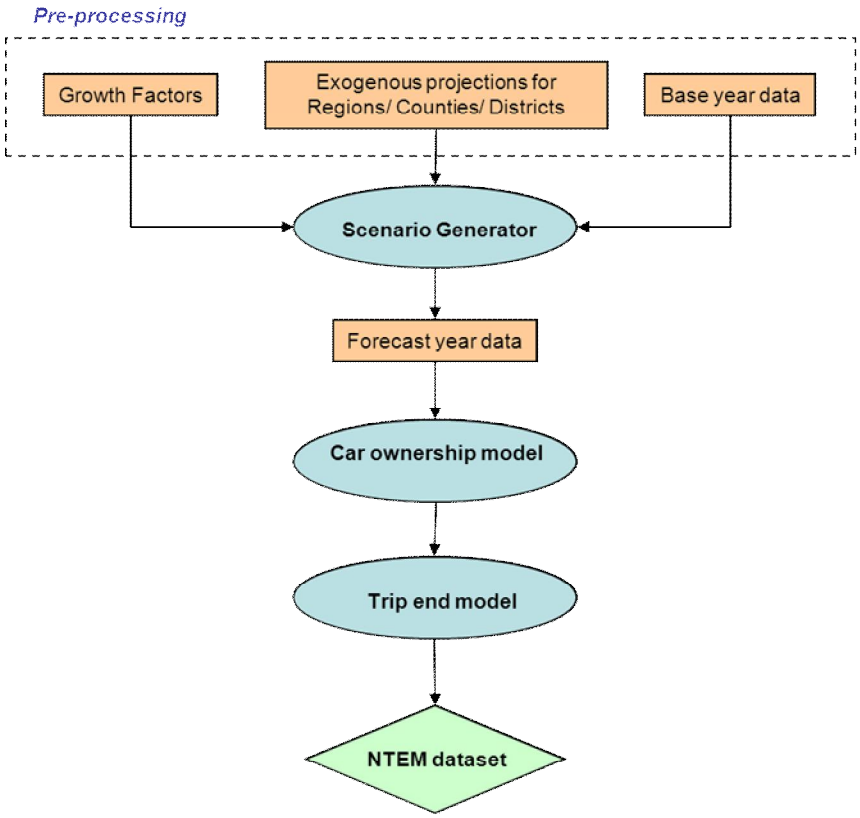

Figure 1.1 Basic steps in generating the NTEM 6.2 dataset

1.3.2 The Scenario Generator software reads in projections for population, households, dwellings and employment at a relatively coarse level. In the case of policy based dwelling inputs these are extracted from published local authority trajectories. The software also reads in a set of Expected Growth Factors (EGFs), representing the levels of growth that would be expected in each zone, as a function of the area type of that zone, or the observed changes in employment premises.

1.3.3 The software uses the base year demographic characteristics of each zone from the 2001 Census of Population. From this, the county/district level projections and the growth factors are used to generate consistent future year planning data at the zonal level. The process runs incrementally through time, with coarse-level changes over the next period being applied to the detailed zone-level results of the previous scenario. This process has been implemented in five year steps for each study area (roughly equivalent to the Government Office Regions, Scotland and Wales), to a forecast year of 2041. Intermediate years released in the NTEM dataset are generated through linear interpolation between the five year Scenario Generator forecasts

1.3.4 Figure 1.2 shows the general structure of a series of forecast runs for a particular study area. Each subsequent scenario builds on the last and at each point results may be exported to the National Trip End Model and the National Car Ownership Model. It is also possible to branch at a certain point and test different planning data inputs beginning from the results of a forecast scenario.

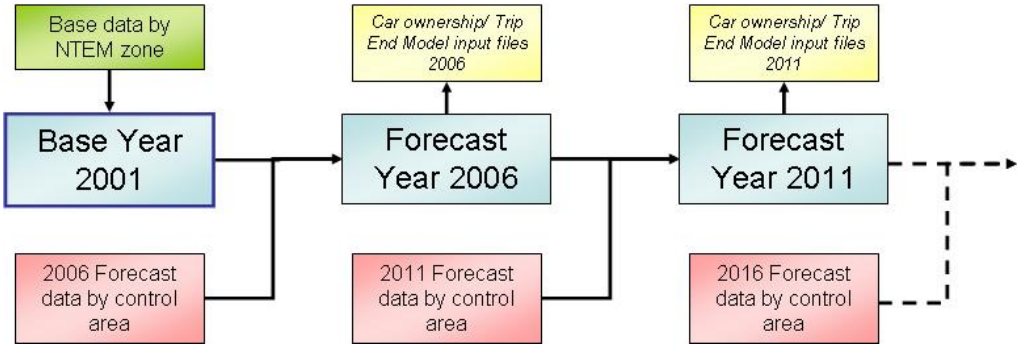

Figure 1.2 Structure of a possible series of scenario tests using Scenario Generator

2 Planning Data Methodology

2.1 SUMMARY

2.1.1 The Scenario Generator is a software tool that produces planning data sets by using base and forecast data supplied by the user at various levels of geographical and other detail. These forecasts are designed to be produced for five year intervals from 2001 to 2041. The software is flexible enough to allow forecasting for any required period at any spatial level given the availability of adequate data input.

2.1.2 For the version 5 (and subsequent) NTEM datasets, this tool has been redesigned in order to run with a new system of NTEM zones based on 2001 Census Output Area geography. Several methodological components have also been included in the enhanced software.

2.1.3 This section outlines the steps that the Scenario Generator performs to produce a consistent set of planning data forecasts. For specific information on the use of the software itself, refer to the Scenario Generator User Guide, delivered as part of the TEMPRO version 5 update.

2.2 OBJECTIVE

2.2.1 The objective of the Scenario Generator is to produce a set of consistent forecasts of population, households and employment for a set of NTEM zones. The planning data forecasts are obtained by scaling up or down a set of "previous" zone specific forecasts to match a new set of control totals for more aggregate areas (districts / counties etc) that are input by the user. Pre-processing of forecast data is required to obtain the initial input control totals.

2.2.2 For each of the main variables there are a set of type categories as follows:

- Employment by sector, gender and hours (full / part time)
- Population by gender, age and working status
- Households by size

2.2.3 Figure 2.1 shows a basic summary of the steps in producing forecast planning data at the NTEM zone level. The fundamental steps are as follows:

- Derive detailed demographic data for the starting year (ie base data or use a previously generated scenario)
- Derive future year data from planning projections or policy-based data sets
- Use expected growth factors to assign change in control area totals to the NTEM zone level
- Balance workforce and workers within a balancing area
- Update worker profile for changes in employment forecasts
- Output planning data for input into the National Car Ownership and Trip End models

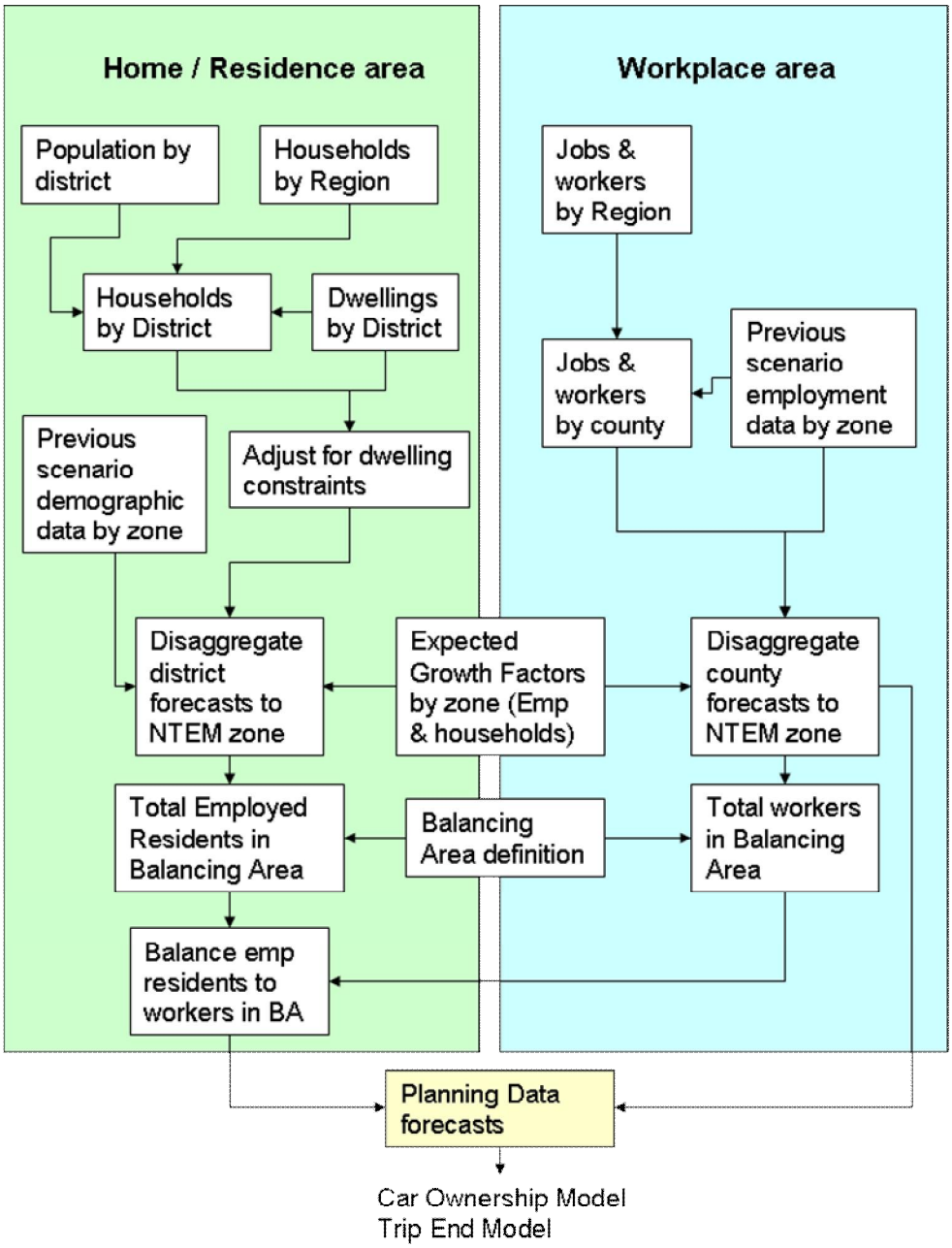

Figure 2.1 Summary of planning data forecasting process

2.2.4 The resulting planning data forecasts are aggregated into fewer categories for use within the national car ownership and trip end models. These may be exported from the Scenario Generator in the precise form required by these models.

2.3 BASIC INPUTS AND SPATIAL DEFINITIONS

STUDY AREA

2.3.1 The methodology assumes that planning data forecasts for each Study Area will be wholly independent of those for other Study Areas in Great Britain. The Study Areas have been defined as the Government Office Regions in England, plus Scotland and Wales. One exception is for the South East, East of England and London Regions. These three are considered as one Study Area- the Wider South East- since London has a large impact on working and commuting patterns on its surrounding Regions. The user may generate forecasts for any one of the Study Areas specified. Multiple Study Areas may be run in batch. This allows separate updates to be made for each Region where specific forecast planning data may be obtained in the future.

CONTROL AREAS

2.3.2 Within each study area, forecast data from various projections or policy-based sources are likely to be provided at a spatial level between NTEM zone and the Region as a whole. These are defined prior to using the Scenario Generator and are referred to as Control Areas. This allows the software to bridge the gap between NTEM zones and the Study Area as a whole. In principle Control Areas could be any level of spatial aggregation that sits between the NTEM zone definitions and the study area definition, ie:

$$\text{NTEM zones} \in \text{control areas} \in \text{study area}$$

2.3.3 Two Control Area schemes exist for the main data types:

- Population-based (population, households and dwellings)
- Employment-based (workers and jobs)

2.3.4 For version 6.x of the NTEM datasets, the population-based and the employment-based Control Areas are both at the local authority district level. This fits in with the main sources of forecast projections, ie ONS/DCLG population and household projections and the employment projections.

BASIC INPUT DATA

2.3.5 There are three main planning data inputs to the forecasting process: households, population and employment (jobs). These input data are typically government provided trend based projections which may be modified during the process of developing a coherent set of planning led forecasts. The input variables are:

- Households by size in the study area (Region) for each forecast year
- Population by gender and age for each control area in each forecast year
- Employment (=jobs) by sector, gender and working status in the control area for each forecast year

2.3.6 The policy based inputs which influence the allocation of population and workers in the forecasting process are determined from projections of dwellings and growth factors that represent expected / likely patterns of development.

- Dwellings in each control area in forecast year
- Expected growth factors in each zone for employment type for the time period

- Expected growth factors in each zone for households (all types) for the time period

2.3.7 As outlined Sections 3 and 4, all working data is adjusted to mid-year estimates to avoid issues of under-enumeration that may be evident from basic 2001 Census data. The method of adjusting the data is covered in these sections.

2.3.8 In addition to the basic input, several control parameters are required in each forecast run. These are base and forecast parameters that are generally global in nature, controlling the performance of the model. These parameters are described in more detail in Appendix D.

POPULATION AND HOUSEHOLDS TOTALS

2.3.9 The input population projections require adjustment to account for those persons not living in households who are excluded from this forecasting process. These are people who live / work in communal establishments which include residential care homes, student halls of residence, military barracks and prisons.

2.3.10 According to the 2001 Census 1.8% of the population of England is not resident in households. Further analysis of the data demonstrates that the proportion of the population in communal establishments varies dramatically by age and to some extent by gender. The largest groups of the population not resident in households are students, mainly between 16-29 and elderly persons aged 65 and over.

2.3.11 There are also marked variations by gender which are most noticeable for the bulk of the adult population (eg 30-65) where a higher proportion of males are resident in communal establishments and the elderly where the proportions are greater for females.

2.3.12 There appears to be only a limited variation in the proportions of institutional variation in the different Regions of the country with the South West having the greatest proportion of elderly in institutions and the South East having more of the younger people (students) residing in institutions.

2.3.13 A set of factors is applied at a fairly detailed breakdown of age, greater than the four main life-stage segments in the model. These are described in Appendix D and presented later in Table D.3 and Table D.4.

2.3.14 The household totals input are taken directly from government projections as the totals for the Study Area / Region and summed over household types. This initial estimate is checked against input dwellings figures and may be subsequently adjusted.

JOBS AND WORKERS TOTALS

2.3.15 A total number of jobs (employment) at the Local Authority (control area) level in each forecast year are provided as an input. This information is used to scale the jobs from the previous scenario which are then aggregated to give the study area totals.

2.3.16 To relate the employment measured in units of jobs to the population measured in units of persons in employment, the numbers of workers are required. A set of factors is derived to relate the numbers of workers to the numbers of jobs. These are described in Appendix D.

CONTROL TOTAL CHECKS

2.3.17 Having established the total numbers of households, people, workers and jobs some checks are made by the Scenario Generator on the totals to ensure that they are logically coherent **before** they are disaggregated both spatially and into the categories required for the car ownership and trip end models. The user imposes the acceptable boundary that each variable should fall within.

2.3.18 The ratios of interest are as follows, including the default limits set up in the system. These are all checked for consistency at the Study Area level.

Table 2.1 Control total checks before Scenario Generator data processing

Ratio	Lower limit	Upper limit
Average adults per household	1	3
Workers to population (employment rate) by gender and age group	50% in general	90% in general
Households to dwellings / household spaces (occupancy and vacancy rates)	-10%	10%
Workers to jobs	No limit, but output to log	

2.3.19 The results of these checks are written to the log file generated for each run. In the case that a certain limit is infringed, the tool will report this and in most circumstances the run will cease. This ensures that the basic input data is robust enough to produce realistic forecasts.

2.4 HOUSEHOLDS BY CONTROL AREA

2.4.1 The allocation of population and households to control areas (districts by default) starts with trend based forecasts and then adjusts these to reflect the dwelling allocations provided by the regional planning bodies. The methodology here is similar to that outlined in the TEMPROv4.2 policy led planning forecasts for London, the South East and East of England Regions.

POPULATION – TREND BASED ESTIMATION

2.4.2 The first step is to disaggregate the study area household projections using input population projections for the control areas. This trend based process assumes the change in household size is uniform for all control areas within the study area, but that the starting pattern of household sizes is retained. The result is the first estimate of household demand for the control area.

2.4.3 The number of households in the control area is then split into 1 person and multi-person households. Due to the changing household sizes through time it is not possible to just take the “previous” split between 1 and 2+ person households in each control area. The overall change for the Region in household size is known from the input data. Using this information the average size of the 2+ person households in each control area can be scaled back. Since some control areas have relatively low household sizes to start with, it is important to check that the resulting number of people per 2+ person household remains above a specified lower limit (ie 2.1).

2.4.4 If any one control area reaches the lower bound, the household sizes in other areas will need to be readjusted to retain the Regional control total. This process iterates until stable, providing the trend-based estimate of households by type.

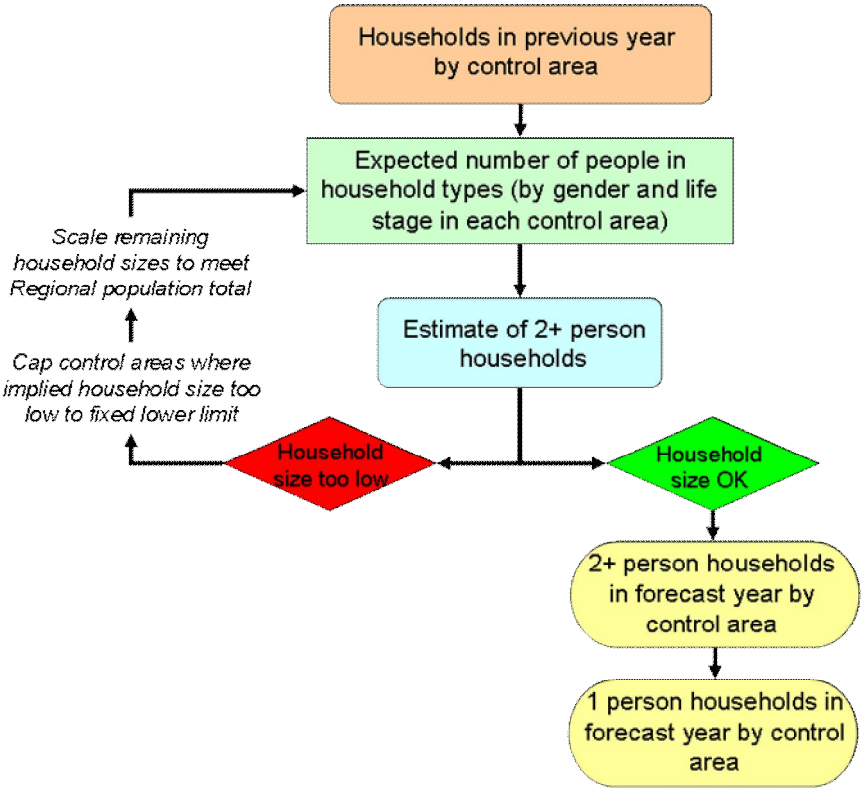

Figure 2.2 First estimate of households by type in each control area based on the change in population

DWELLING SUPPLY – POLICY BASED ESTIMATION

2.4.5 The forecast year households by type for each control area based on the change in dwellings are also estimated. This is because in reality the choice of household location in the future is often affected by the amount of dwelling supply. It is assumed that households and dwelling growth are moving in the same direction, ie both are growing or both are declining. If this is not the case, the household estimates are based purely on population trends as calculated in the previous step for that control area.

2.4.6 To implement this step, the change in households specified by the user at the regional level for the forecast year is broken down to each control area. This is done by using the proportion of dwelling growth a control area is forecast to receive relative to the regional total.

COMBINING TREND AND POLICY BASED ESTIMATES

2.4.7 In practice the pattern of households is likely to be influenced by a mixture of trends and new developments. Thus, a combination of the population-led and dwellings-led approaches are taken. The extent to which household forecasts are policy led is defined by a user specified parameter. To produce the NTEM versions 5 and 6 forecast planning data set a value of 0.75 was adopted, erring more towards policy based forecasts than past trends. If this parameter were set to zero the forecasts would be wholly dependent on population trends, and a value of one indicates that only the dwelling supply contributes to the estimate of households.

2.4.8 It will often be the case that the demand for housing in an area cannot be accommodated by the supply of dwellings. In this case, the Scenario Generator identifies the excess households in each area. The excess may be suppressed or, if capacity exists elsewhere in the study area, a proportion of them may be redistributed to other control areas in the study area.

2.4.9 The potential supply of housing within a control area is based on the number of available household spaces. This is derived mainly from the number of dwellings allocated to each control area. Other factors that are considered in each control area are:

- Occupancy rate (number of households per occupied dwelling)
- Vacancy rate (number of presently uninhabited dwellings)
- Otherwise unoccupied dwellings (second or holiday homes that will not be allocated new households in the distribution process)

2.4.10 Controls are placed on vacancy and occupancy rates so that these do not change radically over a forecast period. These may also be controlled by the user. Occupancy rates may not change by more than 0.5% in a forecast period. Vacancy rates may not reduce by more than 25% of their previous value. Constraints are also placed on these variables to maintain a realistic housing profile.

2.4.11 Once calculated, the estimated number of households required in each control area is compared to the available household spaces. Where this proportion is less than one, households have enough capacity to locate in that control area. Where the proportion is greater than one, excess households occur and are relocated or suppressed or a combination of both.

2.4.12 The suppression of households is expected to alter the mix of household types in the study area due to the different reaction that different households types will have to limited housing capacity. The household type profile of those households being reallocated is assumed to be in line with the control area profile from which the households are moving. The required suppression is a representation of households coalescing or a reduction in household formation. This is more likely to impact on one person households than multi-person households – eg young people staying at home longer or grouping together to form multi-person households since they are unable to afford their own place of residence.

2.4.13 Two key user defined parameters are required here:

- The proportion of excess households that are willing to relocate to other control areas in the Region (default=0.5 for each time period)
- The number of one-person households suppressed per 2+ person households formed (default=3)

2.4.14 Where households wish to relocate, they are redistributed among the remaining control areas within the study area that have capacity. In the rare case that the total capacity in the study area is exceeded, the remainder are suppressed. The total households that were unable to initially be allocated are distributed among the other control areas on a pro-rata basis relative to the proportion of capacity out of the study area total.

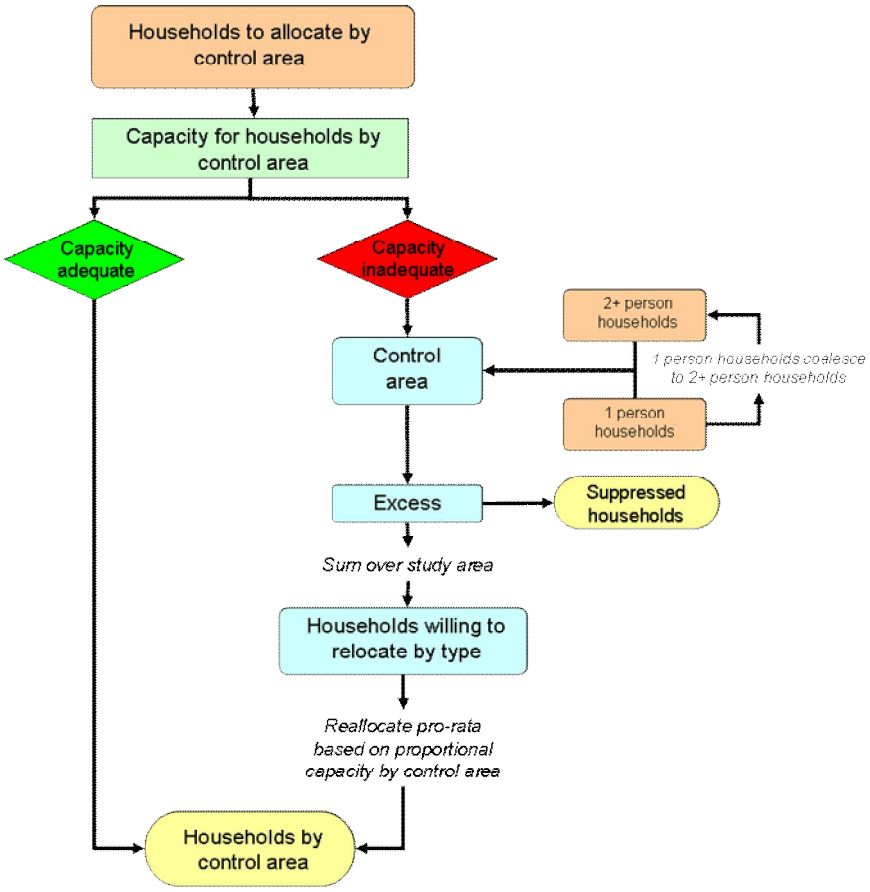

Figure 2.3 Allocation of households to control areas

2.5 POPULATION BY CONTROL AREA

2.5.1 The trend based forecast population is an input for each control area defined. The household forecasts are adjusted to take account of these population trends, the expected change in dwellings and to alleviate housing pressure. Since there is some reallocation of households amongst the control areas within the study area to take account of planning policy, then there should be an associated reallocation of population.

2.5.2 The input population projections are adjusted to reflect the policy based household adjustment. An estimate of the number of people by type in each control area to be reallocated is calculated from the initial household estimate and the final household figures by type, taking into account the population profile (persons per household) in each household type.

2.5.3 Where there is a reduction in the number of households between the trend and policy based forecasts, the population is reduced based on the persons per household in that control area. For areas gaining households, the associated population is determined from the average population profile of all the households relocating.

2.6 POPULATION AND HOUSEHOLDS BY ZONE

2.6.1 The households remain the main allocation variable based on expected patterns of development / trends in development. The households in each control area are thus distributed to the zones within the control areas based on Expected Growth Factors (EGFs) as specified in Section 5. From the zonal household totals, population totals by zone may be derived using the numbers of people expected in each household type. Figure 2.4 shows a diagrammatic view of this process.

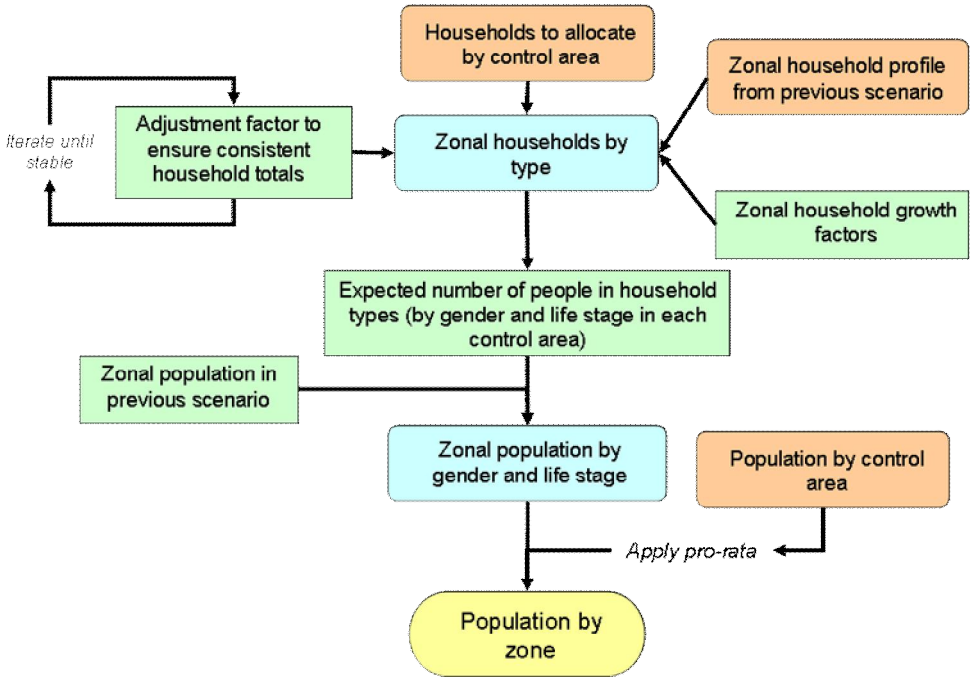

Figure 2.4 Derivation of households and population by zone

2.6.2 EGFs for households are applied to households by zone from the previous scenario to form a profile of household growth for each control area. Where growth factors are applied it is possible that in certain areas households by type become negative where areas are in decline. Where this occurs adjustment is required to cap each case so that they cannot fall below zero. Where this does occur, the total that is adjusted back must be applied to all other zones pro-rata based on their relative EGF. This is an iterative process. Once stable, it is applied to ensure that the resulting number of households in each zone matches the number of households that would be obtained by applying the adjusted growth factors to the previous household total.

2.6.3 Population estimates by zone may be derived from households by application of the expected number of people in household type (using those adjusted for the new population profile after the reallocation of households). Added to disaggregated zonal population totals from the previous scenario, this produces initial estimates of zonal population by gender and age. These are then controlled to the user input population totals for control areas on a pro-rata basis.

2.7 EMPLOYMENT AND WORKERS BY ZONE

2.7.1 The allocation of the employment from the control areas to the zones is carried out using one of three approaches:

- An endogenous approach based on household forecasts (eg schools)
- Employment is assumed to follow trends in exogenous industrial sectors
- Insufficient data exists and growth is assumed to be based on previous totals

2.7.2 The approach adopted for each employment type is shown with the description of the growth factors (EGFs) in Table 5.2.

2.7.3 The allocation of the population led employment is carried out using the projected change in households by zone. This is then adjusted to match the control totals for the employment sector within the control area.

2.7.4 The allocation of the remaining employment sectors (non-population led) is based on a set of growth factors which are exogenously defined. These are calculated by applying growth factors for each employment sector and then controlling to expected change in employment for each control area. The expected change in employment is the previous year's employment factored up by the input EBS / DfT data at the Local Authority level.

2.8 BALANCE WORKFORCE AND WORKERS

2.8.1 This process ensures that workers at the residence and workplace ends within the same area are in balance. This makes use of the balancing area geography that may be seen in Appendix A. The balancing process is concerned primarily with the "working age" population (ie 16-29 and 30-64 age groups). The balancing process ensures that:

- there are the correct number of workers of different types living in the balancing area for the jobs available; and
- the number of workers in each zone does not exceed a specified maximum proportion of the resident population.

2.8.2 These two steps are addressed in turn – first by checking and if necessary adjusting the gender / working status profile for the required workers in the balancing area and secondly reallocating the workers amongst the zones within the balancing area to ensure no zone breaches the ceiling employment rate.

2.8.3 The implied numbers of workers required in balancing area in each age group for the scenario are obtained by converting the employment forecasts (jobs) in to the number of workers and then splitting the workers into the working young (16-29) or working old (30-64) age groups. This makes use of two important sets of user-defined parameters that:

- convert jobs to workers by gender, work type (full time/ part time) and employment sector using the Regional profile; and
- divide workers into young or old, based on their gender and work type using the Regional profile provided by the 2001 SAR.

2.8.4 The changing employment profile through time should lead to a change in the gender profile of the workforce in each employment sector. When this change is not taken into account, the growth in retail and services and the decline in more traditional industries gradually leads to unbelievably high employment rates for females with compensating low level rates of male employment. Similarly the changes might be expected to impact gradually on the split of part time and full-time workers. It is envisaged that the profiles for the employment sectors will change gradually over time. Analysis of the input employment data shows a reasonably constant gender split in each employment sector from 2001 to 2041, indicating this potential problem will occur with the basic data inputs. As a result the Scenario Generator includes an internal adjustment of the assumed gender and working status split by employment sector.

2.8.5 This internal adjustment process uses the following key concepts:

- Treating the previous population and the new (migrating) population as two separate groups
- Treating declines before and completely independently to growth – logically they can only be applied to the "previous" population groups.
- Using "existing" profiles / employment rates from the previous scenario as an initial estimate of workers
- Calculating maximum possible numbers of workers by type
- Adjusting profile of workers demanded so no maxima are breached
- Determining how far it is necessary to move from the initial values towards the maximum values in order to satisfy the demand.

DECREASES IN POPULATION AND / OR WORKERS

2.8.6 If the population in any of the zones within the balancing area is forecast to decline then this would naturally lead to a decrease in the number of workers in the zone(s) irrespective of whether the required workforce in the balancing area is forecast to decline or grow. In addition the workforce required in the balancing area might be forecast to fall more or less than the reduction caused by the population change, or alternatively to increase from the previous scenario. This gives two cases which must be considered initially.

2.8.7 The first stage is to account for any decreases in workers due to decreases in the population. Where this occurs, the population in full time and part time work is reduced according to the current proportions of each.

2.8.8 The second stage is required only if the workforce in the balancing area is forecast to decrease in any work type, gender or age category. In this case the number of workers is reduced while retaining the total forecast population numbers by zone. This is achieved by simply scaling back the number of workers (by status) in each zone to match the control area total. The non workers are then increased proportionally by the same volume to retain the zonal population totals.

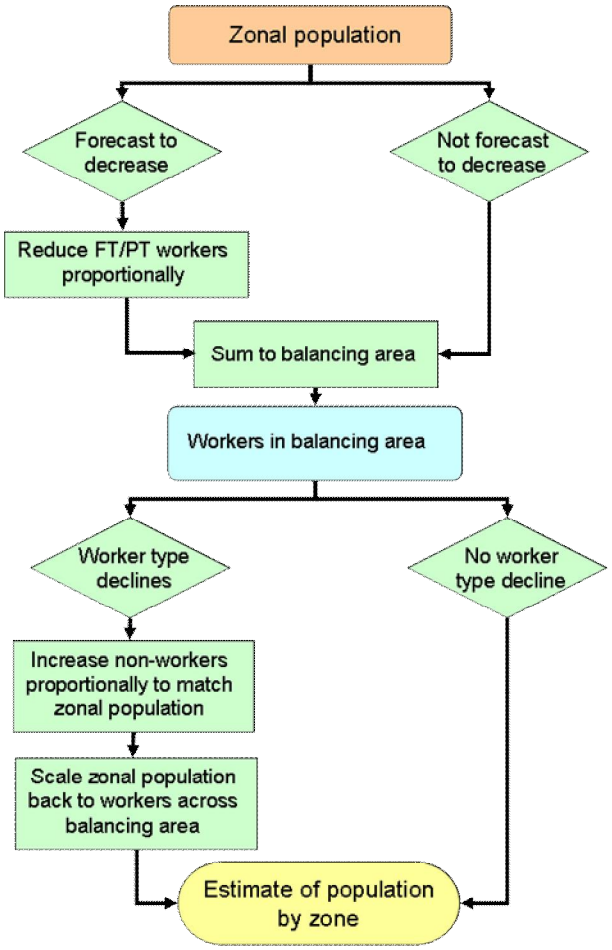

Figure 2.5 Estimation of population based on potential decrease in zonal populations or decreasing worker types within a balancing area

INITIAL ESTIMATES OF WORKING STATUS PROFILE OF ZONAL POPULATION

2.8.9 It is considered that working status profile of large parts of the resident population will not alter significantly through time, while new developments that lead to significant growth in an area might have very different profiles to the existing population. The population is therefore separated into two groups:

- The existing residents – from the previous year / scenario with any declines already subtracted – a group for which the working status is known
- Any increase in population in the forecast year for which the working status has yet to be forecast.

2.8.10 An initial estimate of the population profile can be obtained by assuming the "new" population takes on the same profile as the existing population.

MAXIMUM SUPPLY OF WORKERS BY GENDER

2.8.11 The maximum supply of workers by gender in a forecast year is calculated. It is derived by applying the maximum acceptable change over the forecast period to the previous scenario. This rate is user defined and defaults to +5% (ie employment rate could increase from 65% to 70%). A ceiling is also set for this proportion and when exceeded will cap the maximum worker supply at this level. Maximum employment rate is set for each gender and life stage combination. A ceiling rate is applied to both full time and part time worker types, as well as a maximum for both combined. The Scenario Generator ensures that neither limit is breached.

2.8.12 Since the maximum employment rate has been ascertained, the maximum supply of workers per zone may be calculated. Working age population in the previous year may in the forecast year be capable of working to the higher employment rate. In addition, new working age population introduced through demographic change in the forecast year may introduce new workers, with the maximum capped to the same employment rate. This provides the upper bounds for the number of workers by age and gender.

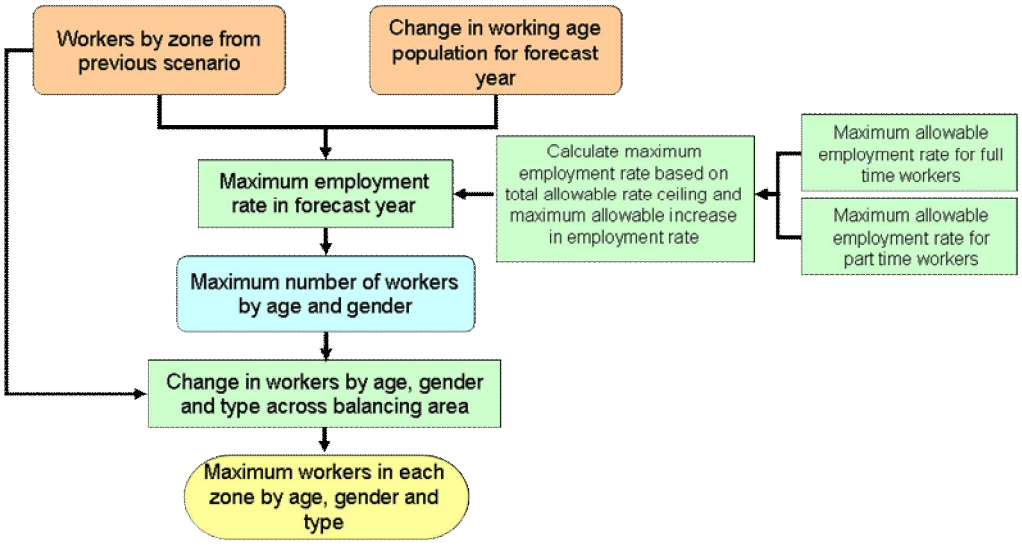

Figure 2.6 Derivation of maximum number of workers in each zone by age, gender and employment type

CHECKING / ADJUSTING THE GENDER PROFILE OF THE WORKERS DEMANDED

2.8.13 On comparing the initial estimates of workers demanded within a balancing area to the maximum available working population, it is possible that in some cases this will be exceeded for at least one combination of gender and age. If for example the demand for male workers cannot be met by the maximum available male workers in the population in the balancing area, these posts are transferred to female workers if any are available in the population.

2.8.14 There are three cases consider for each life stage (working young and working old) in the balancing area:

- There is no excess in demand for workers of either gender;
- There is excess demand for workers of both genders;

- There is excess demand for workers of one gender but not the other.

2.8.15 Where there is no excess in the demand for workers in a balancing area, this indicates that the maximum available workers in the population may accommodate the demand for labour. Therefore no adjustment is necessary between genders.

2.8.16 In the case that there is excess demand for labour for both male and female workers, there is no capacity to reallocate these workers across genders. Therefore this excess is simply cut off so that the maximum number of workers does not exceed the maximum possible working population. This cut off effectively assumes that the posts will be filled by increases in double jobbing and the numbers of workers aged over 64.

2.8.17 In the case that demand for workers in one gender exceeds supply but not the other, there is scope for the demand to be met by workers of the other gender. This of course changes the gender profile of the working population within the balancing area. This is achieved by allocating workers from one gender type to the other. In the event that there is insufficient capacity in the other gender to meet the whole demand, this residual excess is cut off.

2.8.18 Figure 2.7 below shows this allocation process in a simple flow chart up to providing workers in each balancing area by age and gender. It may help understanding by assuming that in this stage, workers by age (working young and working old) are effectively handled separately.

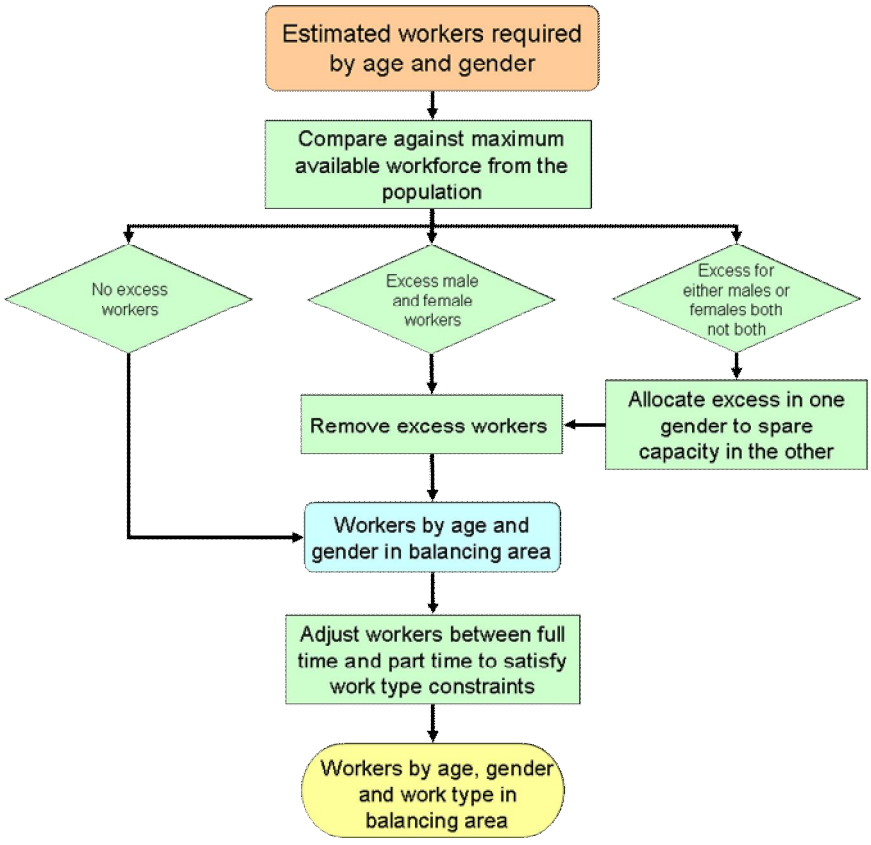

Figure 2.7 Allocation of workers by age and gender in a balancing area

CHECKING / ADJUSTING THE FULL-TIME / PART-TIME SPLIT OF WORKERS

2.8.19 At this stage, workers by age and gender have been resolved, removing any excess workers that cannot be allocated without exceeding the maximum imposed limits. To give a final forecast of the number of workers in each balancing area, the split between full time and part time workers needs to be resolved.

2.8.20 For each age and gender combination, the maximum number of workers available from the population by full time and part time is fixed by the user specified maximum change in employment rate from the previous scenario (5% by default). The Scenario Generator checks whether the number of estimated workers falls within these acceptable limits for each balancing area within the study area.

2.8.21 If full time and part time workers may be accommodated for each case, no adjustment is required. It is not possible for both rates to be exceeded since all potential excess has been removed from the previous step.

2.8.22 Where one worker type is in excess, those extra workers are switched to the other type of work, eg where no more full time workers are permitted, the excess will be accounted for by increasing the number of part time workers.

2.8.23 This gives a final forecast of workers in each balancing area by age, gender and work type. From these, new employment rates may be derived and are output from the Scenario Generator in the log file. The last step is to allocate workers to zones.

ALLOCATIONS OF WORKERS TO ZONES

2.8.24 The allocation of the adjusted and balanced workers to the individual zones is carried out by looking at the difference between the maximum and initial zonal estimates for the numbers of workers and determining what proportion of this difference is needed to achieve the required demand figures.

2.8.25 There are two possible cases:

- the workforce demanded is a greater proportion of the population than in the previous scenario (expected to be the norm),
- the workforce demanded is a smaller proportion of the population than in the previous scenario

2.8.26 If the proportion of the population required to work is less than in the previous population, the initial estimates by zone are simply scaled back based on the difference at the balancing area level.

2.8.27 If the proportion of population working has increased then the employment rate lies somewhere between the initial and the maximum employment rate. Where this is the case, each zone requires the working population to be scaled up accordingly. An adjustment factor is derived for the balancing area according to the relative demand for workers between the initial working population estimate and the maximum number of workers possible in the balancing area. This factor is used to scale each zone and controls the total workers across all zones to the balancing area total.

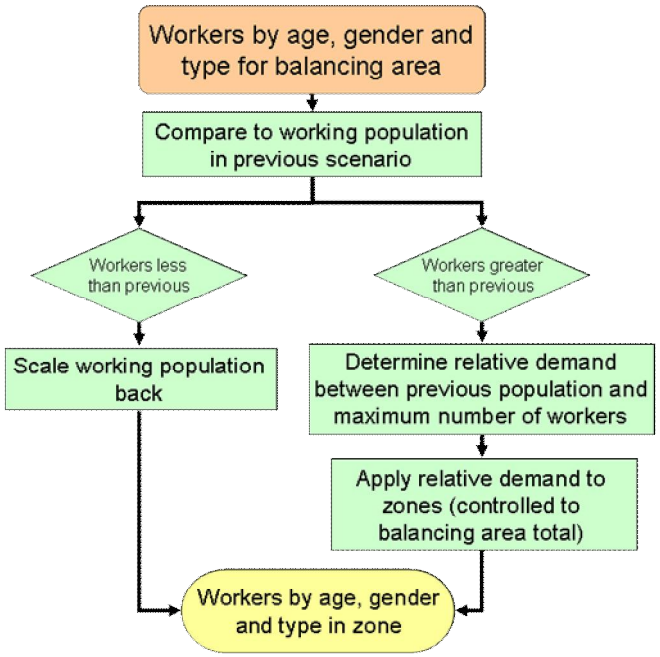

Figure 2.8 Allocating workers from balancing areas to zones

NON WORKERS BY ZONE

2.8.28 What remains is the allocation of non-workers to zones. This places the remaining working age population into the student or other categories. These are derived from the zonal population and workers and the proportion of non-worker types in the previous scenario. This means that the number of students will vary by scenario which is a different assumption to the current version of the Scenario Generator.

2.8.29 In rare cases where no non-workers exist in the previous scenario, yet allocation of non-workers is required, the assumption is made that all will be allocated to the other category. The assumption is that the other category is more ubiquitous than the student category and avoids assigning students in areas potentially a long distance from, for example, higher education. In practise these values will be very small.

2.9 UPDATE EMPLOYMENT FORECASTS FOR CHANGE IN WORKER PROFILE

2.9.1 The number of jobs is taken as an input and from this the required number of workers by gender, age group and working status is determined. This demand for workers may not be achievable for the given population forecasts. In order to balance the demand and supply of workers the Scenario Generator internally adjusts the gender, working status and age profile of the required workforce.

2.9.2 Since the employment forecasts are an input to future scenarios, any adjustments made to the profile of the working population is carried through to adjust the profile of the jobs. This update can be carried out as a final step in the estimation process, solely to provide an improved base from which future scenarios are forecast.

2.10 SUMMARY OF OUTPUTS FROM THE SCENARIO GENERATOR

2.10.1 The Scenario Generator produces three main output files:

- A log file for the scenario/ set of scenarios generated
- Population and household forecasts for the car ownership model
- Population, household and employment forecasts for the trip end model

2.10.2 The log file summarises the performance and key variables associated with each scenario run. The log informs the user of the successfulness of the run and any errors that may have occurred, including warnings where data consistency issues may need to be resolved. For information purposes, the log file also summarises the key elements of a scenario run:

- Input parameter settings
- Checks on control totals
- Allocation and suppression of households
- Allocation of population
- Derived control area vacancy rates

2.10.3 The planning data forecasts for the National Car Ownership Model are output in the appropriate text file format. These are:

- Total population in NTEM zones
- Persons by gender, age and working status

2.10.4 Planning forecasts for the National Trip End Model are output in the expected database format. These are:

Employment forecasts by zone

- Number of jobs
- Number of households
- Number of jobs by sector

Population forecasts by zone

- Population in NTEM zones by gender, age and working status

2.10.5 In addition to the outputs, the results from the forecasting process are stored in data tables within the Scenario Generator database.

3 Data for 2001 Base Year

3.1 SUMMARY

3.1.1 For NTEM 6.2, the base year for the planning data is 2001. This data is primarily obtained from the 2001 Census of Population and then adjusted to 2001 mid-year population data to counter the effects of potential under-enumeration from the Census and for consistency with mid year based projections used for forecasting.

3.1.2 The following data comprise the base year inputs:

- Population living in households (by gender, age and working status in each zone)
- Households (by size in each zone)
- Dwellings (by local authority district control area)
- Employment (jobs, by sector, gender and working status in each zone)
- Mid-year employment estimates for 2001 from projection data (by local authority district control area)

3.1.3 Several additional parameters are required as part of the base data input:

- Occupancy rate by district
- Vacancy rate by district
- Second homes and holiday homes (by zone)
- Persons per household

3.1.4 Base year data is required at the NTEM zone level. NTEM zones are aggregations of Census Output Areas (OAs) to represent different area types in each district.

3.1.5 This section describes the basic data required in the base year- mostly from using 2001 Census tables at the OA level. Where Census tables are not available at this level, data at a more coarse spatial level were used and sound methods were adopted to convert this data to NTEM zones. Those assumptions are outlined here.

3.2 BASE YEAR POPULATION

3.2.1 Base year population is required by gender, age and working status for each NTEM zone. These are broken down into the following categories:

- Gender: male, female
- Age: children (0-15), working age: younger (16-29), working age: older (30-64), pensionable age (65+)
- Working status: full time employed, part time employed, full time students, other

3.2.2 Children and those over the age of 64 are not differentiated by working status. This effectively gives twenty categories of population for each zone.

3.2.3 Table 3.1 shows the data sources used in the derivation of base population data. These were largely taken from a combination of 2001 Census tables. In order to achieve the level of segmentation required, these sources were enough when combined, although categories and definitions between them do vary. Therefore careful matching was required between these sources.

Table 3.1 Data sources used in deriving base population by NTEM zone

Data Source	Geography	Description/ Use
Table CAS001	OA	Elderly people (65+) in communal establishments by gender
Table CAS004	OA	Children (0-15) in households, elderly people (65+) in households by gender
Table CAS030	OA	People of working age (16-74) in households by gender and economic activity
Table CAS028	OA	People in households and communal establishments combined, by age, gender and economic activity
Table UV29	OA	Economically active full time students (aged 16-74) by employment status
Table ST001	Ward	People in households by age and gender
Table ST028	Ward	People in households and communal establishments combined, by age, gender and economic activity
Table T02	Ward	Economically active full-time students by life stage (working young or working old), by working status
2001 Mid Year Population Estimates	Ward	Mid-year estimate of people in households by age and gender (district level in Scotland)
2001 Sample of Anonymised Records (SAR)	Region	Used to derive population control totals

3.2.4 In NTEM 6.2, the 2001 Census data has been adjusted to mid-year estimates of the base year, to overcome potential under-enumeration of data collected from the 2001 Census and for consistency with the mid year based population and household projections. This adjustment is relevant for all of the main base year variables.

3.2.5 2001 mid-year population estimates were obtained from ONS. Mid-year population is compared to basic population figures taken from Census table ST01. This provides a set of scaling factors for gender and age group at ward level for England and Wales. Mid-year population for Scotland is obtained for districts and hence the scaling factors are at this level. These scaling factors are used to adjust the multi-dimensional base population data to mid-year levels. There is a slight difference between age definitions between the two sources (ie mid year estimates have a 0-14 age category rather than 0-15). The scaling method takes account of this.

3.2.6 For NTEM 6.2 a further adjustment has been made to the Census based population data to bring the number of workers (people in employment) in 2001 in line with the figures available from the Labour Force Survey (in 2001). This was achieved using a single scaling factor for each Region in England, Scotland and Wales to adjust the base year working age population derived from the Census (by gender, for the working age young and old age groups) to match the LFS totals. The non working population categories (students and others, by gender and age group) were then scaled back to ensure the total population by age and gender remains consistent with the mid year estimates.

3.2.7 Table 3.2 shows the total population of Great Britain in the base year, divided into the dimensions required in the Scenario Generator.

Table 3.2 Population by gender, age group and working status in Great Britain, 2001

Age group	Working status	Female	Male	Total	Percentage of population
0 - 15	All			11,438,000	20.3%
16 - 29	Full time	2,208,000	3,040,000	5,248,000	9.3%
16 - 29	Part time	983,000	495,000	1,478,000	2.6%
16 - 29	Student	725,000	765,000	1,490,000	2.6%
16 - 29	Other	887,000	533,000	1,420,000	2.5%
30 - 64	Full time	4,895,000	10,063,000	14,957,000	26.5%
30 - 64	Part time	4,109,000	750,000	4,858,000	8.6%
30 - 64	Student	116,000	84,000	200,000	0.4%
30 - 64	Other	4,203,000	2,375,000	6,578,000	11.7%
65+	All	5,002,000	3,735,000	8,736,000	15.5%
All	**All**	**23,128,000**	**21,840,000**	**56,405,000**	**100.0%**

3.3 HOUSEHOLDS

3.3.1 Total households by zone are separated into those households with one person and households with two or more people. This data is adjusted to mid-year estimates also to be comparable with the rest of the planning data.

3.3.2 The following data sources were used to derive the base year household data:

- Census Table UV51: Households by number of resident people by Output Area
- 2001 mid-year household estimates, separated into single person or two or more person households:
  - for England from the Office of the Deputy Prime Minister (ODPM, February 2005)
  - for Wales from the National Assembly for Wales (NAW, 2003)
  - for Scotland from the General Register Office for Scotland (GROS, 2004)

3.3.3 For each English Government Office Region, Scotland and Wales, UV51 was used to give the number of households at Output Area level and aggregated to NTEM zones. These were then summed over Government Office Regions and the totals compared to the mid-year estimates. A scale factor was derived for each combination of region and household size and applied to all NTEM zones.

Table 3.3 Regional household control totals by size for the 2001 base year (thousands)

Region	1 person	2+ people	Total
East Midlands	489	1,248	**1,737**
North East	329	746	**1,075**
North West	871	1,956	**2,827**
Scotland	722	1473	**2,195**
South West	620	1,473	**2,093**
Wales	337	853	**1,190**
West Midlands	620	1,534	**2,154**
Wider South East	2,624	5,942	**8,566**
Yorkshire and the Humber	609	1,460	**2,069**
Grand Total	**7,221**	**16,685**	**23,906**

3.4 DWELLINGS

3.4.1 Base year dwellings data are taken from Census table UV55 for England and Wales and the equivalent UV55 table for Scotland. Dwellings are required by population control area, ie district.

3.4.2 The basic dwellings figures are taken from the Census data and brought into line with mid-year estimates. This is achieved by making use of development figures where available or continuing recent trends to move April dwelling totals to June.

Table 3.4 Regional dwelling control totals for 2001 base year (thousands)

Region	Dwellings
East Midlands	1,801
North East	1,124
North West	2,960
Scotland	2,307
South West	2,188
Wales	1,255
West Midlands	2,225
Wider South East	8,821
Yorkshire and the Humber	2,159
Total	24,841

3.5 BASE YEAR EMPLOYMENT (JOBS)

3.5.1 The data required for the 2001 base year is the number of jobs (both employees and the self employed) in each NTEM zone divided into forty-eight categories by:

- Employment sector (12 NTEM categories E03 to E14)
- Gender (males and females)
- Working status (full time / part time workers)

3.5.2 The definition of NTEM employment types are as shown in Table 3.5.

Table 3.5 NTEM employment types

`	SIC(92) code	Description
E03	801	Primary and Secondary Education
E04	802	Higher Education
E05	803, 804	Adult/ Other Education
E06	551, 552	Hotels, campsites etc
E07	501, 503, 505, 521-525, 5262, 5263, 55303	Retail trade
E08	851	Health / Medical
E09	502, 504, 527, 641, 6512, 703, 711, 714, 852, 853, 93	Services (business and other) & equipment rental & repair household goods & postal / courier services
E10	10-45, 51, 60-62, 631, 632, 634, 90	Industry, Construction & transport
E11	55301, 55302, 554	Restaurants & bars
E12	63303, 91, 9213, 923, 925-927	Recreation & sport
E13	01, 02, 05	Agriculture & fishing
E14	Other	Business

3.5.3 The process is made more complex by the definition of employment. Household based surveys typically measure the number of workers while employer surveys provide information on the numbers of jobs. The two data sets differ in some cases quite markedly due to double jobbing and job sharing in addition to differences caused by the survey design and samples surveyed (age groups included etc).

3.5.4 The basic data used are shown in Table 3.6 below.

3.5.5 The Census is the most comprehensive data set of workers and forms the basis of the employment estimates to be input to the NTEM planning data forecasting process. As with deriving population input data, various different data sources are required to achieve the dimensions required. These vary in terms of segmentation, spatial detail and coverage and hence care is needed to combine the sources into a coherent data set.

3.5.6 Table T10 and W201 for each region in England and Table TV201 for Scotland is used to provide the proportion of the employed population in each of the 4 categories of work status and gender in each Region. The IDBR was then used to give the classification in 12 industrial categories. However, the SIC classification in the Census does not compare well with the data set being used for forecasting (based on Experian (EBS) definitions). A separate processing step splits the education category to school, further and adult education using the IDBR data.

3.5.7 Jobs by employment sector from the EBS data are therefore assigned equivalent NTEM employment types (see Table 3.7). A breakdown of industrial class for each of the four categories (by gender and work type) for each local authority district was derived to apportion workers in each zone into an industry type, by male and female full time and part time.

3.5.8 Jobs are controlled to the regional 2001 totals from Workforce jobs, scaled down from the Workforce Jobs total for Great Britain (29.1m) to the previous NTEM total (28.5m), as the definition of Workforce Jobs is believed to include approximately 0.6m jobs that are not included in the NTEM definition (including workers living in communal

establishments and a possible double counting of workers who work for an agency but also report themselves as self-employed).

Table 3.6 Data sources used to derive base year employment by NTEM zone

Data Source	Geography	Description/ Use in NTEM
Table UV75	OA	Workers by life stage, from ONS for England and Wales and GROS for Scotland
Table T10	Ward	Workplace population by gender and work type, from ONS for England and Wales
Table W201	Ward	Origin-destination of workers by gender, full time, part time or full time student, from ONS
2001 SAR	Region	Cross-tabulation of split of life stage, gender and working status within the Region
2001 Experian Business Solutions (EBS) employment data	1991 County	Used to split total employment down into employment sector profiles
1998 Inter-Departmental Business Register (IDBR)	1998 Ward	Allows splitting of education employment into the three types required in NTEM based on proportions as at April 1998
2001 Labour Force Survey (LFS)	Region	Details of rates of second-jobbing by Region, ONS
Workforce Jobs	Region	Split of jobs by region

Table 3.7 Correspondence between EBS and NTEM employment types

EBS Type	NTEM Type
Education	E03 to E05
Accommodation	E06 & E11
Retail	E07
Health & Medical	E08
Services	E09
Industry, Construction & Transport	E10
Restaurants & Bars	E06 & E11
Recreation & Sport	E12
Agriculture, etc	E13
Business	E14

3.5.9 Data from the 2003 Labour Force Survey (LFS) was originally used to convert the number of workers to jobs. However for the NTEM 6.2 dataset, the LFS data was used to adjust the numbers of workers in the Base year population data and does not affect the employment (jobs) numbers.

Table 3.8 Jobs in each NTEM category by gender and working status in Great Britain, 2001 (thousands)

Employment Type	NTEM Type	Male Full Time	Male Part Time	Female Full Time	Female Part Time	Total
E03 Education (school)	E03	258	104	391	501	1,254
E04 Education (higher)	E04	133	51	187	220	590
E05 Education (adult/other)	E05	49	19	74	90	232
E06 Accommodation	E06	107	57	90	121	375
E07 Retail trade	E07	1,026	403	689	1,299	3,417
E08 Health/Medical	E08	295	100	742	776	1,913
E09 Services	E09	949	211	844	832	2,835
E10 Industry/Construction/transport	E10	6,048	325	1,438	518	8,329
E11 Restaurants & bars	E11	236	194	180	380	990
E12 Recreation & sport	E12	352	154	274	307	1,086
E13 Agriculture & fishing	E13	270	44	62	53	429
E14 Business	E14	3,294	486	2,025	1,250	7,054
Grand Total	Total	13,016	2,148	6,994	6,347	28,505

4 Forecast Data and Projections

4.1 SUMMARY

4.1.1 For each study area and forecast year, the following data are required for any forecast year / scenario combination:

- Population projections (by age and gender) in each district control area
- Household projections (by size) for the study area (Region)
- Forecast dwellings (in each district control area)
- Employment projections (by sector, gender and working status in each district control area)
- Zonal growth factors for employment in the period modelled (by sector)
- Zonal growth factors for the period for households

4.2 FORECAST POPULATION DATA

DATA REQUIRED

4.2.1 For future years, the population is required for each control area (district) subdivided by gender and age group. Ultimately, the groups required are:

- Children under 16;
- Males/ females aged 16-29;
- Males/ females aged 30-64;
- Males/ females for each subsequent five-year age band from 65 up to 84;
- Males/ females ages 85 and over.

POPULATION PROJECTIONS

4.2.2 Population projections exist in two formats national projections and sub national projections. Since 2006, the Office for National Statistics has been responsible for producing both datasets. The most recent national data is 2008 based mid year estimates, containing projections for England, Wales and Scotland at the national level for each year up to 2033 then for selected years up to 2083 (including the five year steps required to 2041). ONS provides a breakdown of these figures to the district level but only up to 2033, and these sub national projections have also been used for NTEM 6.2.

4.2.3 The forecast extrapolations from 2033 to 2041 for the sub national data use national data as control totals for England, Wales and Scotland and estimation is made at the district level. Table 4.1 shows a summary of the total population projections by year and region input to the NTEM forecasting process. Figure 4.1 and Figure 4.2 show this trend graphically, separated by gender. The regional population projections act as control totals for the district level projections.

Table 4.1 Total population projections by region, 2006-2041 (thousands)

Region	2006	2011	2016	2021	2026	2031	2036	2041
East Midlands	4,364	4,538	4,719	4,912	5,101	5,275	5,431	5,580
East of England	5,607	5,883	6,174	6,471	6,757	7,016	7,268	7,492
London	7,512	7,868	8,206	8,526	8,813	9,083	9,338	9,577
North East	2,555	2,602	2,655	2,709	2,766	2,813	2,852	2,897
North West	6,855	6,943	7,064	7,199	7,326	7,431	7,515	7,619
Scotland	5,117	5,233	5,324	5,411	5,483	5,532	5,558	5,571
South East	8,237	8,565	8,895	9,248	9,600	9,925	10,219	10,485
South West	5,125	5,341	5,556	5,787	6,022	6,240	6,436	6,611
Wales	2,966	3,024	3,104	3,187	3,263	3,326	3,376	3,418
West Midlands	5,368	5,487	5,629	5,782	5,931	6,066	6,178	6,297
Yorkshire and The Humber	5,141	5,350	5,572	5,797	6,017	6,221	6,404	6,567
Grand Total	**58,846**	**60,834**	**62,900**	**65,030**	**67,080**	**68,928**	**70,575**	**72,114**

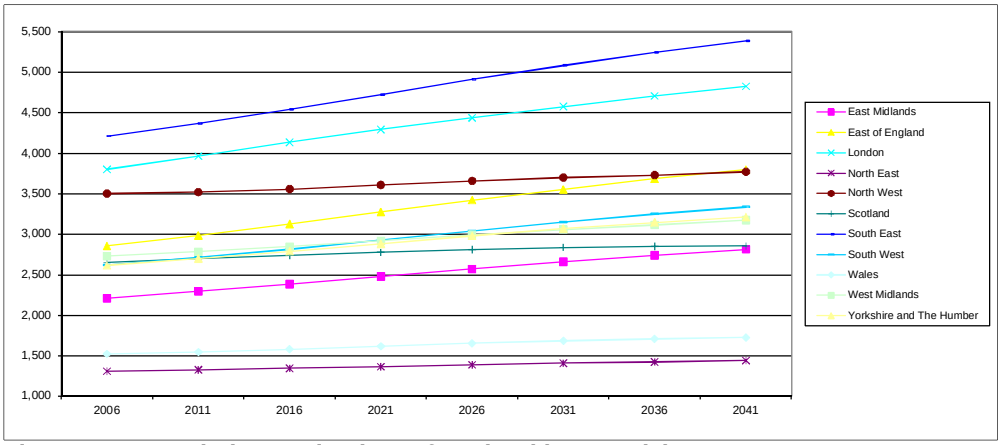

Figure 4.1 Population projections, females (thousands), 2006-2041

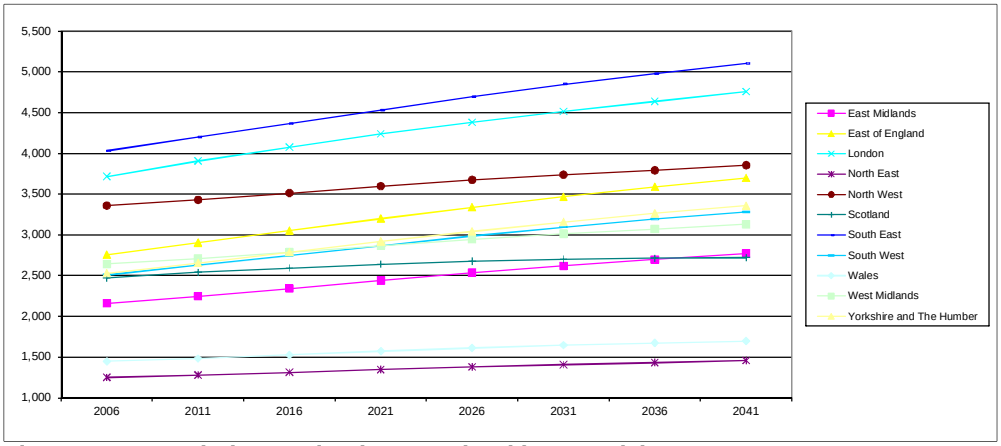

Figure 4.2 Population projections, males (thousands), 2006-2041

4.2.4 Data for England, Wales and Scotland at the district level is currently available from 2008 up to 2033. The long-term trend (2008-2033 for England, 2011 to 2033 for Wales and Scotland) for each population segment was used to extrapolate district trends onwards up to 2035, then half this trend to 2041. The results were then controlled to the national projections for 2036 and 2041.

4.3 FORECAST HOUSEHOLDS DATA

4.3.1 The household projections input to the NTEM 6.2 forecasts were 2008 based projections for each country downloaded from the internet. These were from DCLG for England, the GROS for Scotland and from the Welsh Assembly government websites. In each case the projections ran from 2008 to 2033 with varying intermediate years provided. Projections from earlier years (2001 and 2006 – now historic data) were taken from previously released datasets as used in the earlier versions of NTEM.

4.3.2 All household projection data sets are mid-year based, hence no adjustment is required to bring them in line with other data.

4.3.3 Household projections are required for five-year intervals from 2001 to 2041 by region, subdivided into 1 person and 2+ person households. Where household projections existed, they were taken as given. Forecast extrapolations are carried out using a simple methodology, separated into two stages:

- Follow trends in household size by region to convert population forecasts into household forecasts by Region;
- Derive split of 1 person / 2+ persons households by following the trend in the proportion of 2+ person households for each Region, then applying this to projected total households

4.3.4 The 2008 household projections are based on the 2008 based population projections also being used for the NTEM forecasts. In this case it is therefore unnecessary to scale the household projections to match the population projections. Previously, in NTEM 5.4, the 2006 household projections required scaling to match with the 2008 based population projections.

4.3.5 Figure 4.3 shows the derived household sizes for each Region. These are the based on the input household projection data and may be adjusted by the Scenario Generator for the later, years if households are suppressed due to insufficient dwellings being available. The effects of household suppression on the output household sizes are explained in Section 6.2.

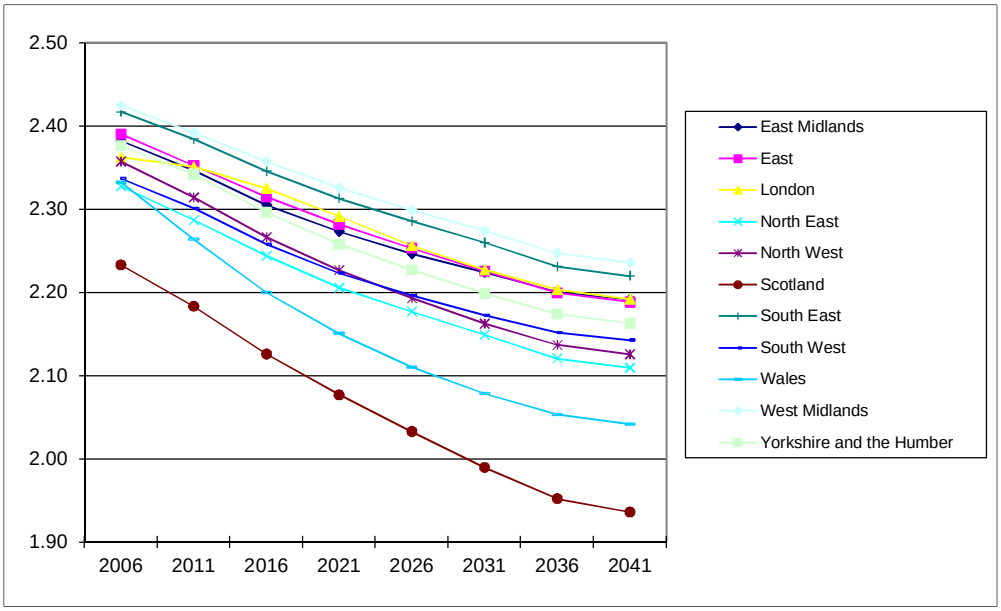

Figure 4.3 Average household size by region based on input data, 2006-2041

4.3.6 The following charts and tables show the final input household projections by Region between 2001 and 2041, divided into single person and two or more person households.

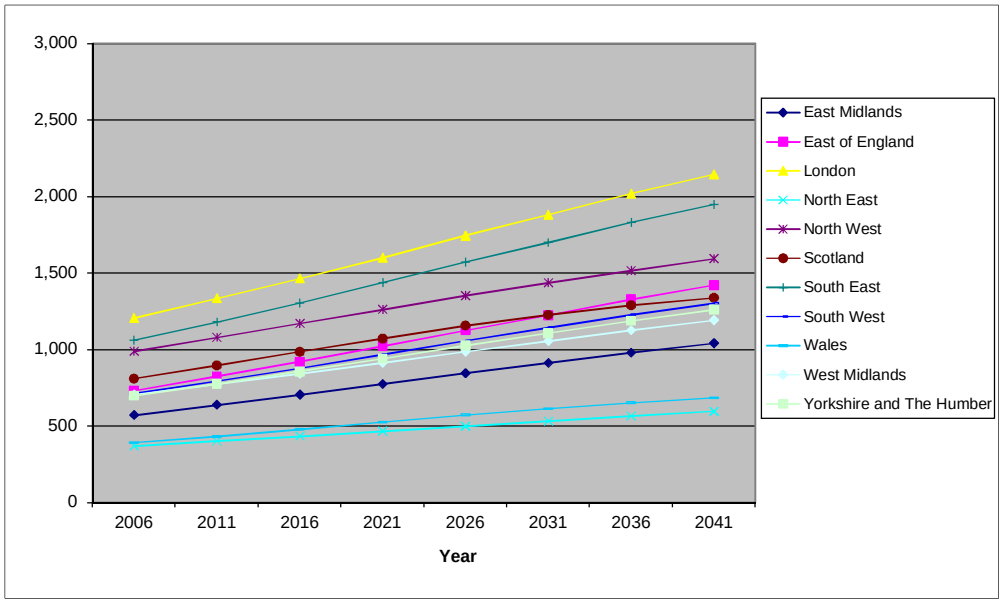

Figure 4.4 Household projections by Region for single person households, 2006-2041 (thousands)

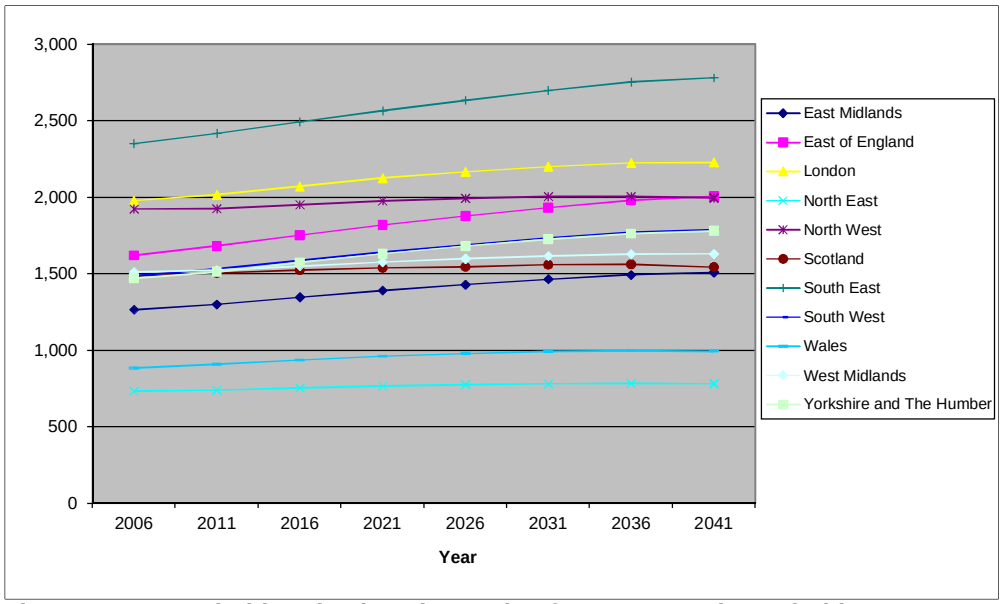

Figure 4.5 Household projections by Region for 2+ person households, 2006-2041 (thousands)

Table 4.2 Household projections by Region for single person households, 2006-2041 (thousands)

Region	2006	2011	2016	2021	2026	2031	2036	2041
East Midlands	569	636	703	773	844	910	977	1,039
East of England	728	822	918	1,021	1,124	1,223	1,326	1,419
London	1,204	1,332	1,462	1,598	1,742	1,880	2,016	2,144
North East	367	400	432	464	498	531	564	594
North West	987	1,077	1,168	1,260	1,350	1,434	1,515	1,591
Scotland	809	894	983	1,069	1,155	1,224	1,288	1,336
South East	1,059	1,178	1,302	1,435	1,569	1,697	1,828	1,946
South West	710	791	875	965	1,055	1,140	1,223	1,299
Wales	390	430	477	523	570	611	649	683
West Midlands	704	772	840	911	984	1,054	1,124	1,190
Yorkshire and The Humber	696	774	855	939	1,024	1,106	1,186	1,259
All GB	**10,228**	**11,116**	**12,031**	**12,980**	**13,941**	**14,840**	**15,732**	**16,540**

Table 4.3 Household projections by Region for 2+ person households, 2006-2041

Region	2006	2011	2016	2021	2026	2031	2036	2041
East Midlands	1,263	1,298	1,344	1,388	1,427	1,462	1,491	1,507
East of England	1,618	1,679	1,749	1,816	1,875	1,930	1,979	2,005
London	1,976	2,015	2,068	2,123	2,164	2,199	2,222	2,226
North East	731	738	752	764	773	778	781	779
North West	1,921	1,924	1,949	1,974	1,991	2,002	2,002	1,993
Scotland	1,482	1,503	1,521	1,536	1,542	1,556	1,559	1,541
South East	2,349	2,415	2,491	2,564	2,631	2,695	2,752	2,778
South West	1,483	1,531	1,586	1,638	1,687	1,732	1,768	1,786
Wales	882	906	934	959	976	989	995	991
West Midlands	1,510	1,522	1,548	1,574	1,596	1,614	1,626	1,627
Yorkshire and The Humber	1,468	1,511	1,572	1,629	1,678	1,724	1,760	1,778
All GB	**18,690**	**19,053**	**19,529**	**19,985**	**20,367**	**20,713**	**20,972**	**21,052**

4.4 POLICY-BASED DWELLINGS DATA

4.4.1 For England and Wales the dwelling stock in 2006 is extracted from "Data on Dwelling Stock by Local Authority" published by the Office for National Statistics (ONS). In Scotland, 2006 dwelling stock is obtained from Estimates of Households and Dwellings in Scotland 2007 (Table 2) published by the General Register Office for Scotland (GROS) in May 2008.

4.4.2 This is then combined with the projected annual averages of housing completion from 2006 onwards to calculate the cumulative dwelling stock at Local Authority level at 5 year intervals from 2006 to 2041.

4.4.3 In NTEM 5.4 the spatial pattern of residential development was based upon the Regional Spatial Strategies (RSS) for each Region, or the nearest equivalent documents. For the NTEM6.2 dataset the dwelling trajectories for England, Wales and Scotland were updated to reflect the latest available published information. Due to the different planning systems and monitoring requirements in England, Wales and Scotland), a different methodology was required for each country.

England

4.4.4 Dwelling growth was obtained from the housing trajectory contained within the latest Annual Monitoring Report (AMR) published by each local authority. Where the December 2010 report, covering the financial year 2009/2010 was not available, the December 2009 report was used.

4.4.5 The creation of 8 new unitary councils in 2009 meant that 36 of the 2001 districts no longer exist. The trajectories for these former authorities have been obtained from the most recent AMR where available, or from the December 2009 AMR of the district prior to its abolition.

4.4.6 National Parks also have a statutory duty to provide an AMR containing dwelling trajectories. These trajectories provide dwellings in addition to those of the local authorities in which the National Parks reside. Although small, this growth has been accounted for by uniformly distributing the growth to the local authorities containing the National Parks.

4.4.7 The AMR was used to determine a trajectory to at least 2021. To extend this to 2041, a trend-based approach was adopted assuming that growth rates continued at the average rate of the latest 10 years of available projections from the AMRs. Details of the AMRs providing dwellings inputs can be found in Appendix C.

Wales

4.4.8 Until 2004, Welsh authorities were in the process of developing a Unitary Development Plan (UDP). However since 2004 changes to the planning system mean that they moved to develop a Local Development Plan (LDP).

4.4.9 The local authorities are in various stages of the planning process and so:

- Where an adopted LDP is in place, the proposed housing trajectory is used
- Where an un-adopted LDP contains only a single housing trajectory then that is used
- In other cases the trajectory from the UDP was used.

4.4.10 The documents do not set out detailed trajectories, but estimate the level of growth required over a period of years. The average yearly dwelling growth is then estimated. Table 4.4 summarises the source of the Welsh dwelling trajectories together with the planned annual growth rate. In the absence of future year data, a trend-based approach was adopted based on these dwelling figures in order to derive a complete set of dwelling assumptions to 2041. The trajectory was extended to 2041 assuming a yearly growth rate equivalent to that of the yearly average of the latest 10 years projections

Table 4.4: Source of dwelling trajectories for the Welsh Local Authorities

Welsh Unitary Authority	Planned growth Dwellings per Annum	Planning document used	Date	Comment
Anglesey	120dpa	UDP	2006	
Blaenau Gwent	200dpa	LDP	2008	
Bridgend	497dpa	UDP	2005	
Caerphilly	685dpa	LDP	2010	Latest update is based upon 10,269 dwellings 2006 to 2026
Cardiff	1120dpa	UDP	2003	The LDP has been stopped by the council due to inspectors report. This included concerns about housing. UDP plan not adopted but contains lower growth than LDP
Carmarthenshire	753dpa	UDP	2006	
Ceredigion	448dpa after 2011	LDP	2010	LDP suggests 6,000 dwellings 2007-2022
Conwy	420dpa	LDP	2009	LDP suggests 6,300 dwellings 2007-2022
Denbighshire	500dpa	LDP	2009	LDP suggest 7,500 dwellings 2006 to 2022
Flintshire	438dpa	UDP	2006	No LDP. Used 2006 update to UDP (which is not adopted)
Gwynedd SP	335dpa	UDP	2009	
Merthyr	253dpa	LDP	2008	
Monmouthshire	400dpa after 2011	LDP	2009	LDP has options, but sets out a preferred strategy following consultation
Neath Port Talbot	437dpa	UDP	2008	Adopted UDP used
Newport	740dpa	UDP	2006	Adopted UDP used
Pembrokeshire	735dpa after 2011	UDP & LDP	2006	LDP only provides a trajectory after 2011. UDP used prior to 2011
Powys	409dpa	UDP	2010	Adopted UDP used
Rhondda	465dpa	LDP	2009	
Swansea	978dpa	UDP	2008	
Torfaen	420dpa	LDP	2008	
Glamorgan	500dpa after 2011	UDP & LDP	2007	LDP only provides a trajectory after 2011. UDP used prior to 2011
Wrexham	501dpa	LDP	2005	LDP. 8065 between 2006 and 2021 (501dpa after 2008)

ScotlandThe LATIS (Land use and Transport in Scotland) framework provides a land use and transport modelling service in Scotland. In order to ensure the model is kept up to date Transport Scotland periodically undertake a survey of Local Authorities to determine their planned dwelling growth. The latest survey was undertaken in 2010, and the responses have been provided by Transport Scotland and used for the NTEM6.2 dataset. To extend the dataset to 2041, a trend-based approach was adopted assuming a yearly growth rate equivalent to that of the yearly average of the latest 10 years projections.

4.4.12 Figure 4.6 and Table 4.5 summarise the dwelling assumptions for each Region for each five year period from 2006 to 2041.

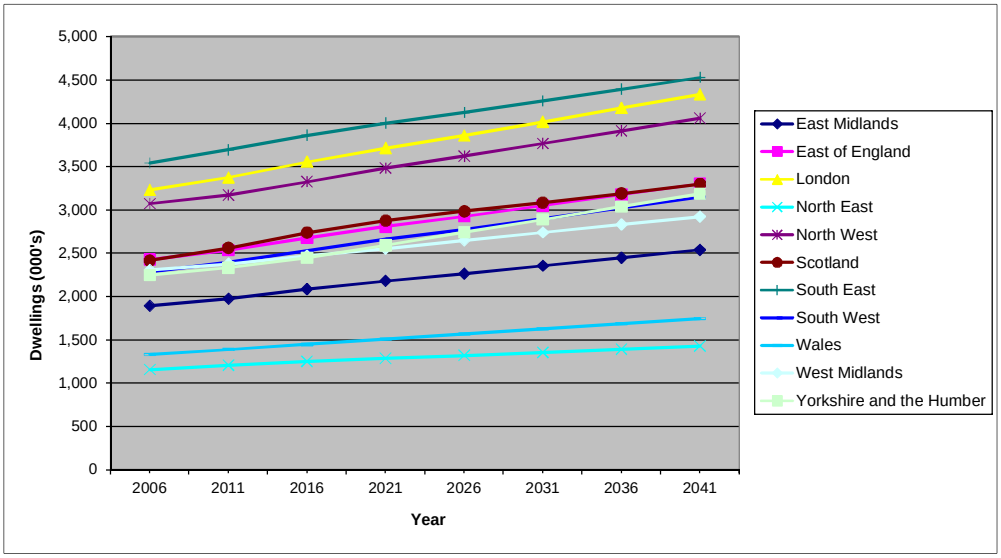

Figure 4.6 Dwelling forecasts, 2006-2041 (thousands)

Table 4.5 Dwellings by region, 2006-2041 (thousands)

Region	2006	2011	2016	2021	2026	2031	2036	2041
East Midlands	1,889	1,972	2,083	2,176	2,261	2,353	2,445	2,537
East of England	2,424	2,532	2,675	2,803	2,921	3,046	3,172	3,298
London	3,229	3,372	3,550	3,711	3,855	4,014	4,173	4,332
North East	1,154	1,203	1,249	1,285	1,317	1,353	1,389	1,425
North West	3,069	3,168	3,322	3,478	3,617	3,762	3,908	4,055
Scotland	2,413	2,558	2,734	2,872	2,981	3,079	3,187	3,295
South East	3,539	3,691	3,858	4,000	4,120	4,255	4,390	4,526
South West	2,282	2,395	2,526	2,660	2,770	2,895	3,019	3,143
Wales	1,329	1,386	1,445	1,505	1,564	1,624	1,683	1,743
West Midlands	2,304	2,373	2,464	2,550	2,645	2,736	2,828	2,920
Yorkshire and the Humber	2,245	2,330	2,444	2,588	2,738	2,886	3,034	3,182
Total GB Dwellings	**25,876**	**26,981**	**28,350**	**29,627**	**30,792**	**32,003**	**33,228**	**34,453**

4.5 FORECAST EMPLOYMENT DATA

4.5.1 The employment data input data provides the number of jobs segmented by:

- Gender
- Employment status (full time or part time)
- Employment sector (for the twelve NTEM categories)

4.5.2 Those in full time employment are defined as those that work 30 hours or more per week. Part time employment is anything less than this.

4.5.3 Employment forecasts are produced by the DfT, using:

- Office for Budget Responsibility employment growth (for 2009-2015, March 2011 budget) and Treasury employment forecasts (2016-2041), as a national level constraint;
- Experian Business Studies (EBS) forecasts at Local Authority/District level;

- historic data (1982-2006) by employment sector, at national level (provided by EBS)
- the DfT employment forecasting model, which calculates employment by sector at Local Authority level.

4.5.4 The EBS historic data, on which the employment sector growth is based, is divided into relevant categories described above. A correspondence may be derived between the EBS employment categories and the equivalent NTEM categories as done for the base year data. The conversion may be seen in Table 3.7 of Section 3.

4.5.5 The EBS data has a self-employed category in addition to full time and part time employees. These are allocated into full time or part time based on the proportions given in Census Table ST038 (Sex and industry by employment status by hours worked). Again, the conversion from SIC92 code to NTEM employment types is required.

4.5.6 The control total for education employment across the three categories is derived for each forecast year using the same method. The split between them is derived by following the trend in population by age group. The trend in population ages 0-15 is applied to primary and secondary education (E03). Higher education (E04) follows the trend in 16-29 year olds. Adult and other education (E05) follows the 30-64 trend.

4.5.7 Figure 4.7 below shows total employment by Region for each forecast year. Table 4.6 shows the same input employment forecasts for Great Britain segmented into each NTEM employment sector.

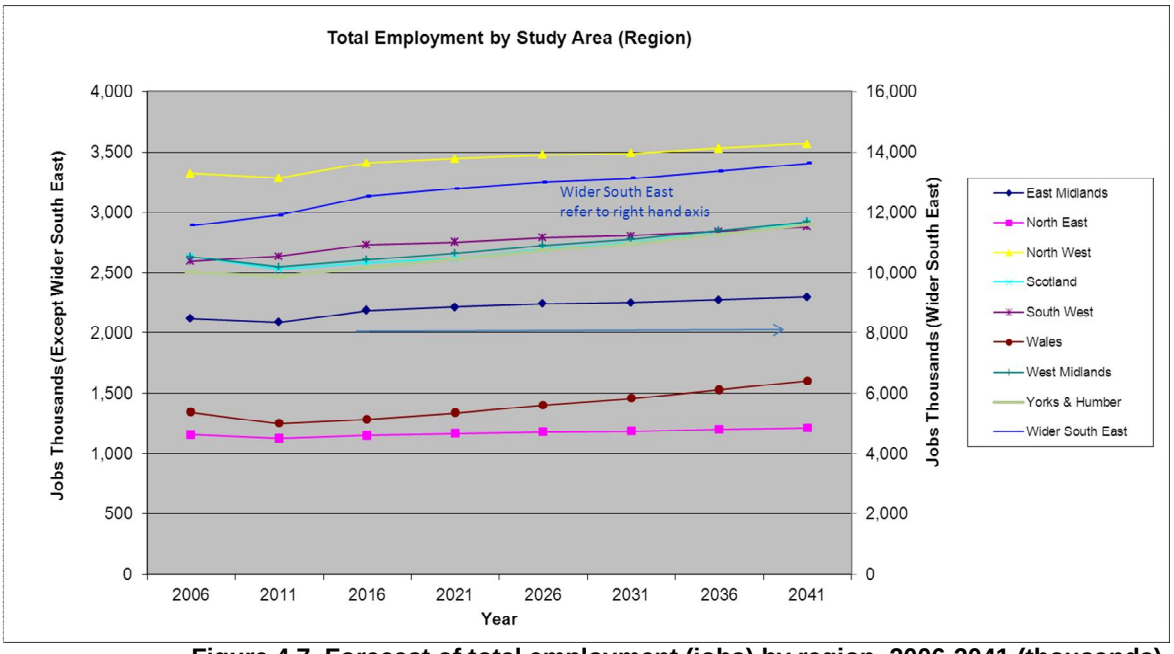

Figure 4.7 Forecast of total employment (jobs) by region, 2006-2041 (thousands)

Table 4.6 Total employment (jobs) by NTEM sector, 2001 – 2041 (thousands)

Employment	2001	2006	2011	2016	2021	2026	2031	2036	2041
E03 Primary & Secondary Schools	1,254	1,437	1,665	1,761	1,853	1,906	1,940	1,979	2,028
E04 Higher Education	590	567	612	615	594	589	587	590	588
E05 Adult Education	232	255	272	282	290	298	301	307	315
E06 Hotels, Campsites etc.	375	380	377	386	390	393	393	394	395
E07 Retail Trade	3,417	3,387	3,033	3,124	3,103	3,066	2,992	2,935	2,874
E08 Health, Medical	1,913	2,172	2,463	2,787	3,032	3,325	3,629	3,932	4,189
E09 Services & Eqpt Rental	2,835	3,066	3,246	3,405	3,521	3,641	3,725	3,826	3,935
E10 Industry, Construct, Transport	8,329	8,130	7,767	7,186	6,554	5,978	5,394	4,886	4,432
E11 Restaurants & Bars	990	1,051	1,007	1,098	1,154	1,206	1,244	1,291	1,337
E12 Recreation & Sport	1,086	1,166	1,131	1,267	1,370	1,472	1,563	1,668	1,777
E13 Agriculture & Fishing	429	392	353	320	287	256	225	199	177
E14 Business	7,054	7,856	7,904	8,791	9,430	10,060	10,597	11,225	11,864
Grand Total	**28,505**	**29,859**	**29,831**	**31,021**	**31,576**	**32,191**	**32,591**	**33,232**	**33,912**

4.5.8 As part of the forecasting process, the employment totals (jobs) are converted to numbers of workers within the Scenario Generator using a parameter that defines the ratio of workers within each employment sector by gender and working status to jobs for each Region. This is described in more detail in Appendix D.

5 Expected Growth Factors

5.1 SUMMARY

5.1.1 Expected Growth Factors (EGFs) influence how much employment and household development from the control area total is distributed to its constituent NTEM zones. In practice this will be governed by a large array of influences, such as pulls of demand and constraints of supply. The EGF methodology is necessary in the absence of a complete set of specific data of individual housing and employment sites over time below the district or county levels.

5.1.2 The outline is presented here of the generation of EGF assumptions for the initial set of NTEM forecasts. Where more specific information may be obtained in the future, the Scenario Generator allows the user flexibility in determining EGFs for every zone for any forecast period.

5.1.3 There are two sets of EGFs required:

- Household growth for zones within a control area (in this case, districts)
- Employment growth for zones within a control area (in this case, districts), which requires growth rates for each employment sector by zone (for a certain period).

5.1.4 There are two different schemes for applying the EGFs, depending on which method the user wishes to implement: growth weights and growth trends. The Scenario Generator tool is capable of using either one of these methods as determined by the user.

- Weights: EGFs are used as a basis of proportional change expected in each zone for the variable in question.
- Trends: EGFs are used as relative linear factors that will distribute to each zone within a control area based on their relative sizes. This is practically the same as providing absolute expected growth (or decline) over time.

5.1.5 Figure 5.1 shows the impact of the two approaches graphically. The input EGFs are applied to the previous scenario data to give an initial estimate of the new zonal values. These are the points on the left in the charts. The EGFs are then adjusted so that the required control totals are obtained. In the weights based approach the adjustment is multiplicative, while in the trends based approach it is additive. This gives the final set of zonal values shown to the right on the two charts.

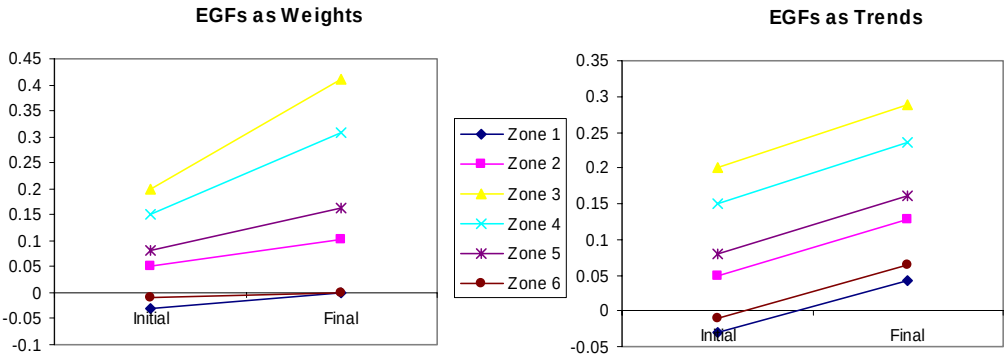

Figure 5.1 Expected growth factors applied as weights and trends

5.1.6 The forecasts delivered for NTEM versions 5 and 6 are generated using the weights-based methodology.

5.2 HOUSEHOLD EGFS

5.2.1 Household growth factors are required for each NTEM zone, representing the change in total households. These growth factors are derived by assessing the historic growth between 1991 and 2001 for each 2001-based Planning Area Type (taken from the DfT study in “Impacts of land use planning policy on transport demand and congestion”, 2004). This area typology is based on clustering together areas that possess similar demographic and morphological characteristics. This resulted in the identification of seven area types that should share similar patterns of housing development over time. Figure 5.2 shows the planning area types derived for each administrative ward in 2001.

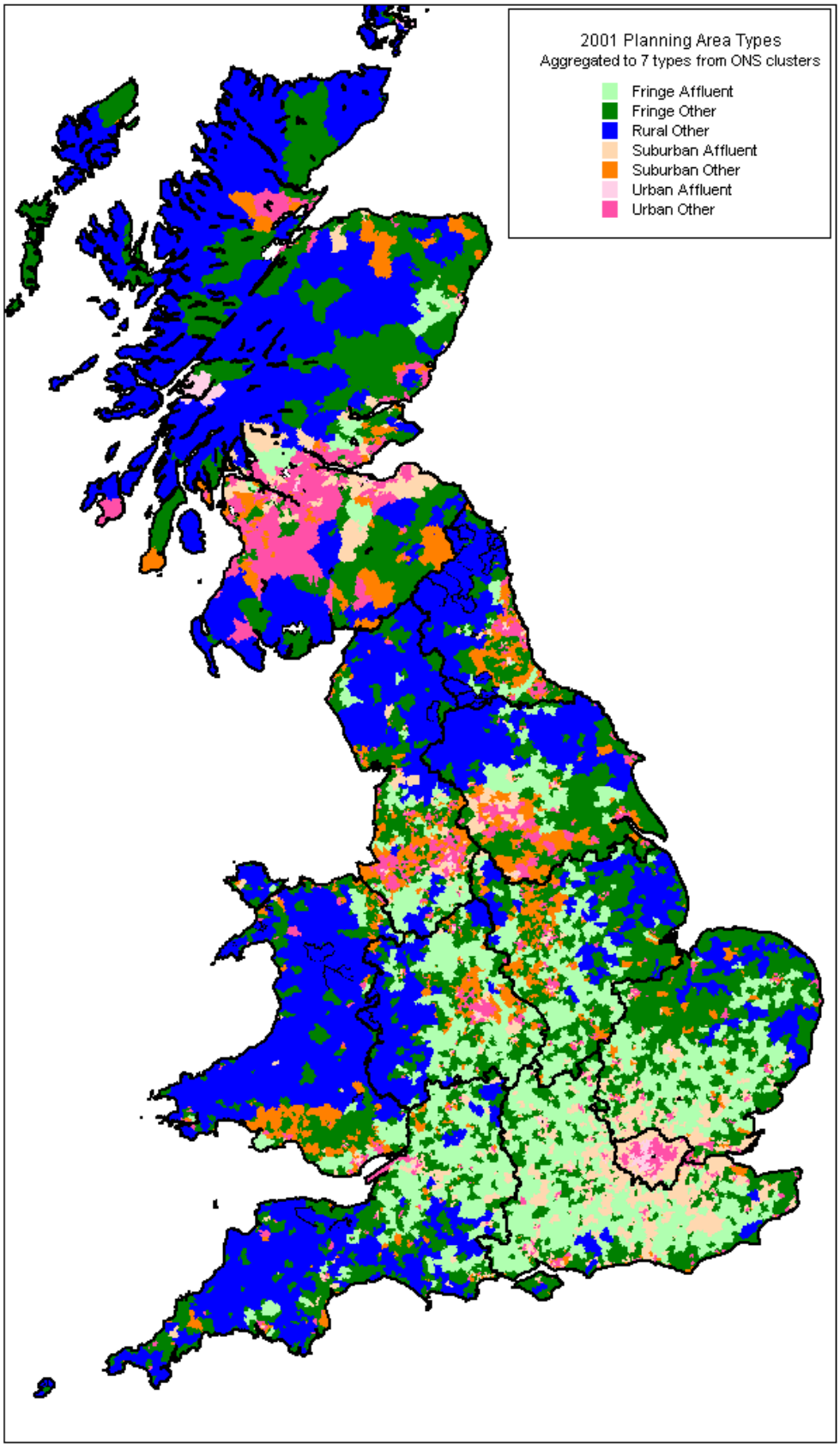

Figure 5.2 2001 Planning area types used in household EGF calculation

5.2.2 The trend in household change from 1991 to 2001 was taken from the Census of Population household data. Due to large differences in the geography of the two sources, a method was used to allow a comparison between them. This involves breaking down 1991 ward to nearest equivalent OAs and then aggregating to approximations of 2001 wards.

5.2.3 To increase the accuracy of the area type methodology, growth for different planning areas were separated into regions. This will contribute towards accounting for any regional variation in planning policy that may exist. Table 5.1 shows the assumed growth rates for the planning area types in each region. Note that these are rounded to the nearest whole percentage.

Table 5.1 Household growth by region and area type

Area Type	East Midlands	East of England	London	North East	North West	Scotland	South East	South West	Wales	West Midlands	Yorkshire and The Humber
Urban Affluent	18%	14%	11%	6%	13%	12%	17%	16%	10%	10%	16%
Urban Other	6%	8%	10%	0%	2%	5%	9%	7%	5%	4%	2%
Suburban Affluent	11%	11%	6%	3%	8%	9%	10%	10%	11%	9%	9%
Suburban Other	11%	12%	0%	7%	7%	9%	9%	12%	10%	8%	8%
Fringe Affluent	14%	10%	4%	14%	11%	11%	9%	13%	15%	11%	16%
Fringe Other	14%	16%	8%	6%	9%	12%	14%	15%	7%	10%	11%
Rural Other	12%	10%	0%	30%	11%	13%	7%	13%	12%	17%	11%

5.2.4 Wards of the same planning area type in a region are assumed to have the same level of growth (as indicated in Table 5.1). The final household growth factors for each NTEM zone are therefore a weighted average of growth according to the constituent OAs that nest within them and their residence within different planning area types.

5.2.5 On allocating households at the zone level, these growth factors are used to growth up the households that already exist in those zones. The total growth is controlled to the total number of households expected in the control area. Therefore growth factors are adjusted either proportionally (weights-based approach) or linearly (trend-based approach) in order to obtain the required district household total.

EXAMPLE

Selby zone in Yorks & Humber (zone code 36UH1) has 63 Output Areas of the following types:

Urban Other	33 zones	2% expected growth rate
Fringe Other	14 zones	11% expected growth rate
Suburban Other	12 zones	8% expected growth rate
Suburban Affluent	4 zones	9% expected growth rate

Taking a weighted average of the expected rates of household growth within this zone, Selby has an average expected growth factor of 5.6%

Barlby is a neighbouring zone within the same control area (zone code 36UH5). This has 11 Output Areas of the following types:

Suburban Affluent	9 zones	9% expected growth rate
Fringe Other	2 zones	11% expected growth rate

Barlby has a weighted average growth factor of 9.4%.

In this example above, Barlby would be expected to receive more household growth than Selby relative to its initial stock. This of course is not necessarily a greater total number of households as this will depend on relative initial size and the total internal adjustment required to the growth factors.

In 2001 Selby has 7,814 households and Barlby has 1,379. Using the growth factors, the initial estimate of households is thus:

Selby 7,814 * 0.056 = + 438 households
Barlby 1,379 * 0.094 = + 130 households

As an example, if only these two zones were in the control area and our control total of household growth is 700, we need to factor up the growth rates in order to achieve this growth.

Using a weight-based approach, this is proportionately (maintaining the same ratio between growth rates by multiplying through to get the correct growth required):

Selby 7,814 * (0.056 * 700/568) = 7,814 * 0.069 = 540 households
Barlby 1,379 * (0.094 * 700/568) = 1,379 * 0.116 = 160 households

Using a trend-based approach this is linearly (maintaining the same absolute difference between growth rates):

Selby 7,814 * (0.056 + 0.0144) = 7,814 * 0.0705 = 550 households
Barlby 1,379 * (0.094 + 0.0144) = 1,379 * 0.1085 = 150 households

5.2.6 **Figure 5.3** shows the input household EGFs within each control area district. To aid analysis and understanding, the main detail to note is the relative difference in the colours **within** each control area. This indicates the relative growth of each zone within that control area, between which the total household growth is to be apportioned. The actual colour presented is of little relevance when comparing different districts.

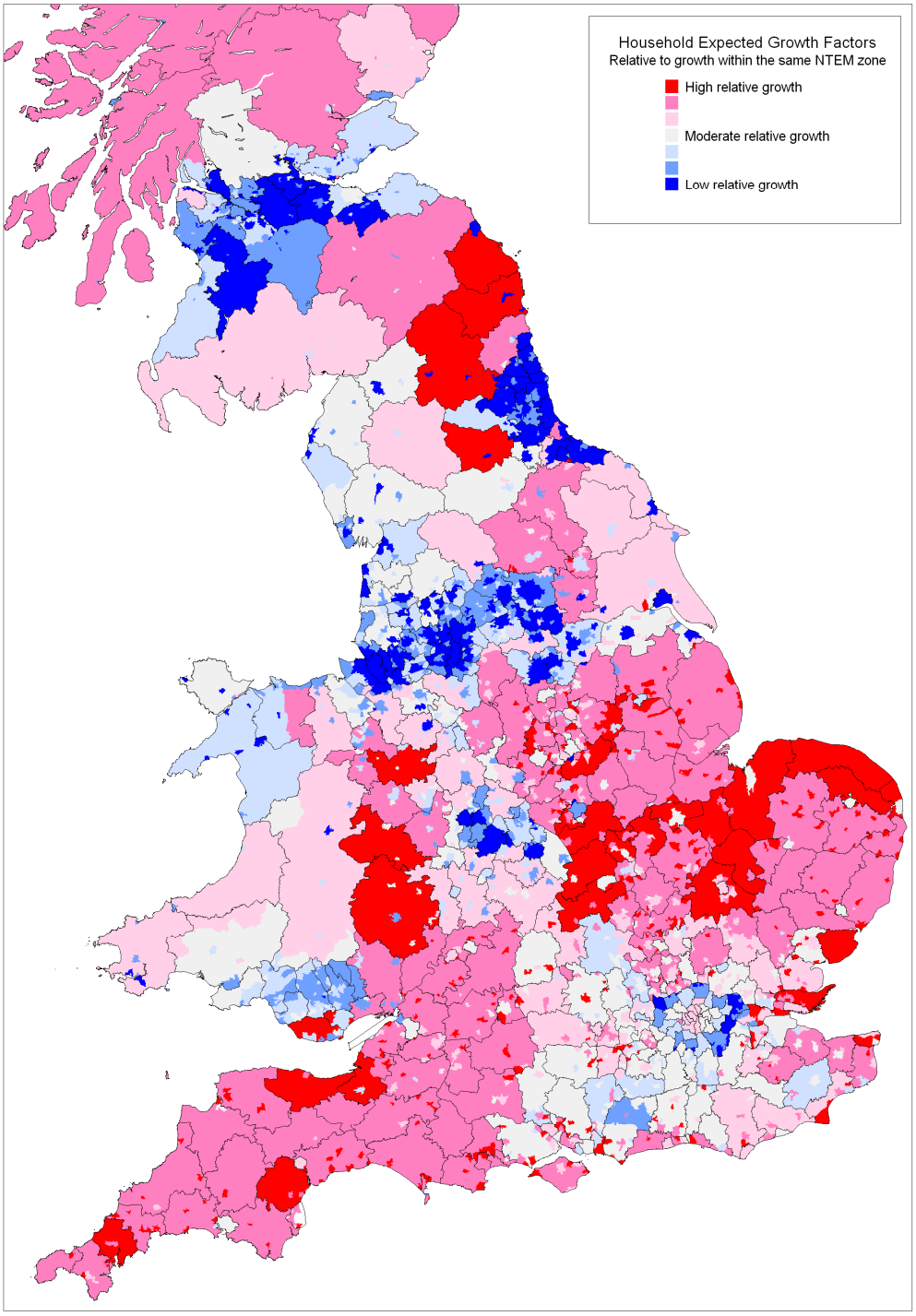

Figure 5.3 Expected Growth Factors for households (district control areas)

5.3 EMPLOYMENT EGFS

5.3.1 Table 5.2 shows the proposed source of EGFs for each NTEM employment type. These are derived by one of two approaches:

- Dwellings-led (ie schools and leisure activities)
- Constant, all assumed to grow relative to their existing size

Table 5.2 Potential source of EGFs for each NTEM employment type a

Code	NTEM employment type	Potential EGF source
E03	Primary and secondary school employment	Dwellings-led
E04	Higher education employment	Constant, relative to size
E05	Adult education employment	Constant, relative to size
E06	Hotels, campsites, etc	Constant, relative to size
E07	Retail trade	Constant, relative to size
E08	Health/ medical employment	Constant, relative to size
E09	Services (business & other, eqpt rental, repairs)	Constant, relative to size
E10	Industry, construction and transport	Constant, relative to size
E11	Restaurants and bars	Constant, relative to size
E12	Recreation and sport	Dwellings-led
E13	Agriculture and fishing	Constant, relative to size
E14	Business	Constant, relative to size
E15	Holiday accommodation and second residences	Constant, relative to size

5.3.2 For dwelling-led growth, these types do not require input growth factors, since they will be allocated using generated household results in the Scenario Generator tool.

5.3.3 The growth factors produced for the NTEM data sets versions 5 and 6 use a weights-based approach. These factors are set as constant, therefore causing growth to be distributed pro rata according to existing stock.

5.3.4 The Scenario Generator includes the capability to set the EGFs for each forecast year. This allows the addition of more specific information where it may be obtained, for example from approved employment developments and future Local Plans.

6 Planning Data Results

6.1 INTRODUCTION

6.1.1 This section outlines the results from NTEM 6.2 and compares them with NTEM 5.4. This will help to explain:

- The main trends in the NTEM 6.2 dataset as output from the Scenario Generator, National Car Ownership Model and National Trip End Model;
- The similarities and differences between the NTEM 5.4 and 6.2 datasets to show how the planning data and ultimately the trip ends may differ from before.

6.1.2 Where data are analysed at a spatially detailed level, the forecast year of 2021 has been used to review the results midway through the forecast process.

6.2 PLANNING DATA (SCENARIO GENERATOR)

PLANNING DATA INTERPRETATION

AVERAGE HOUSEHOLD SIZE

6.2.1 Average household sizes decrease over time as shown in Figure 6.1. These differ from the implied household sizes from the input projection data due to the impacts of housing pressure as explained below. The Wider South East has the highest average household size by 2026 as insufficient dwellings allocations prevent household formation and more people living together in 2+ person households.

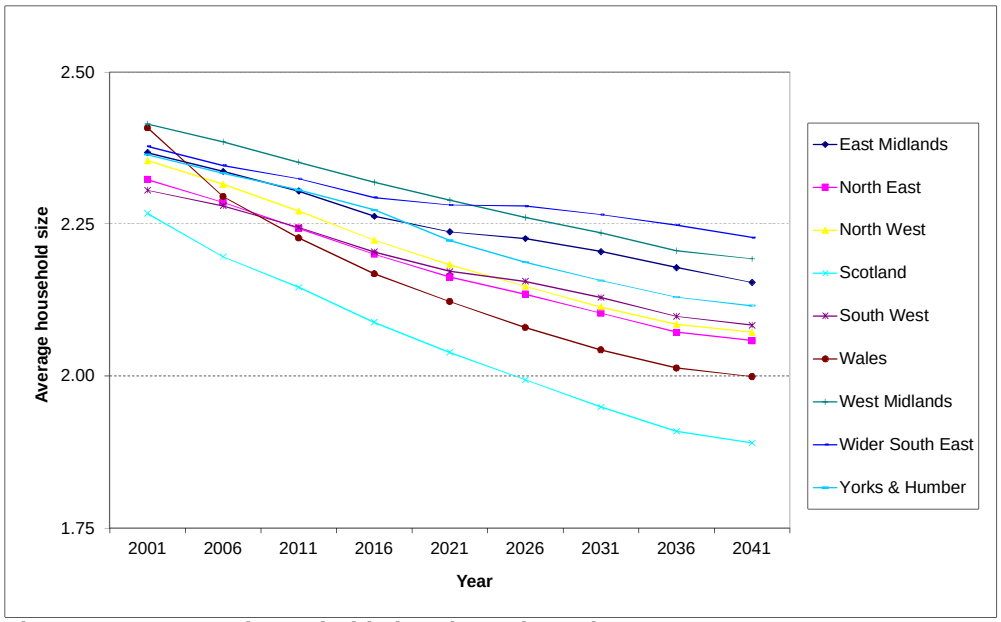

Figure 6.1 Average household sizes in each study area

6.2.2 Figure 6.2 shows the average household sizes at the district level in the 2021 forecast year. The separate chart colours represent the nine study areas. Most districts fall into a range of around 2 to 2.3 persons per household (72%). Wider South East shows the largest spread of household sizes by 2021- the highest in Slough at 2.56 persons per household and the lowest in City of London at 1.77.

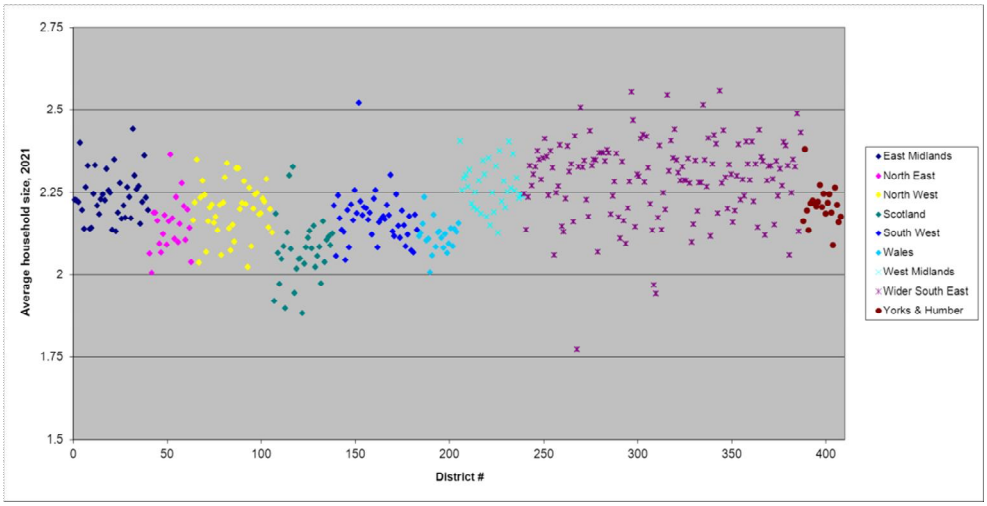

Figure 6.2 Average household size by district in 2021

VACANCY RATES

6.2.3 Figure 6.3 shows the vacancy rate by district in 2021.

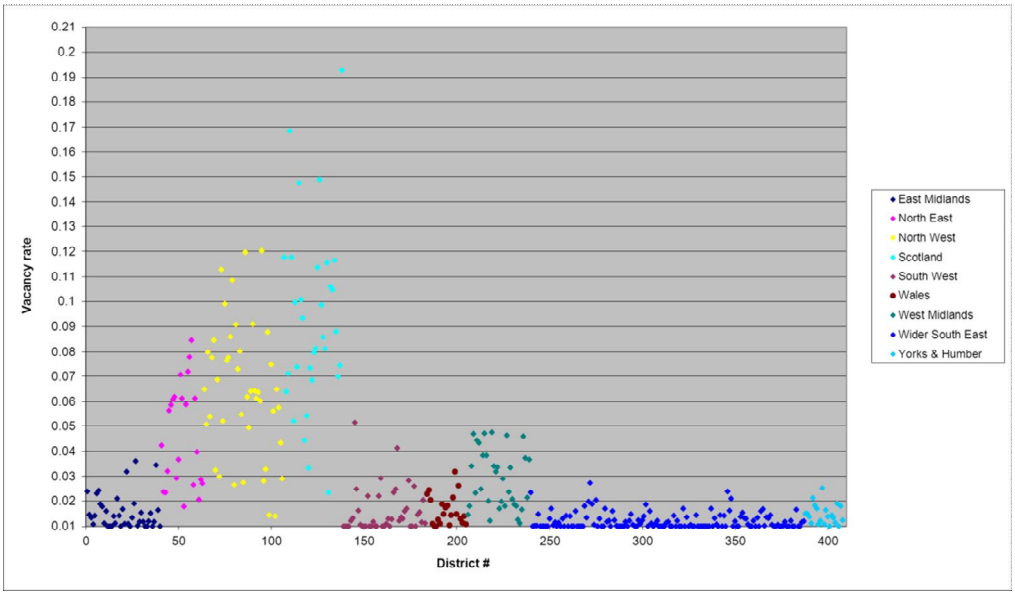

Figure 6.3 Vacancy rates by district in 2021

6.2.4 Observations concerning vacancy rates over time are as follows:

- Generally high in Scotland, the North East, the North West and the West Midlands.
- Bournemouth in the South West and Eilean Siar in Scotland are relatively very high compared to other districts in these two Regions.
- In most Regions with relatively low vacancy rates by 2021, all constituent districts converge to the base rate of 1% towards 2041. This is due to household inputs being relatively higher than dwelling inputs at the Regional level.

HOUSING PRESSURE

6.2.5 Where household capacity is insufficient within one control area (district) 50% of the excess households are reallocated evenly to the other control areas (districts) in the Region with vacant dwellings available and the other half of the excess are suppressed.

6.2.6 Figure 6.4 and

6.2.7 Figure **6.5** below show information from the household allocation process in the Scenario Generator for forecast runs of each year and study area, showing first the capacity after the initial allocation and secondly the households suppressed during the allocation process based on space available.

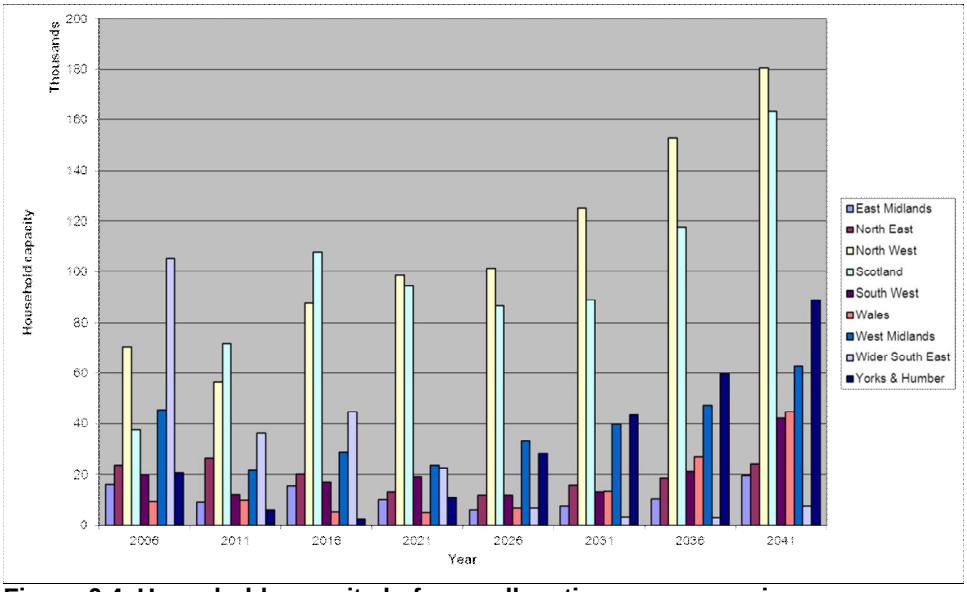

Figure 6.4 Household capacity before reallocating or suppressing excess households

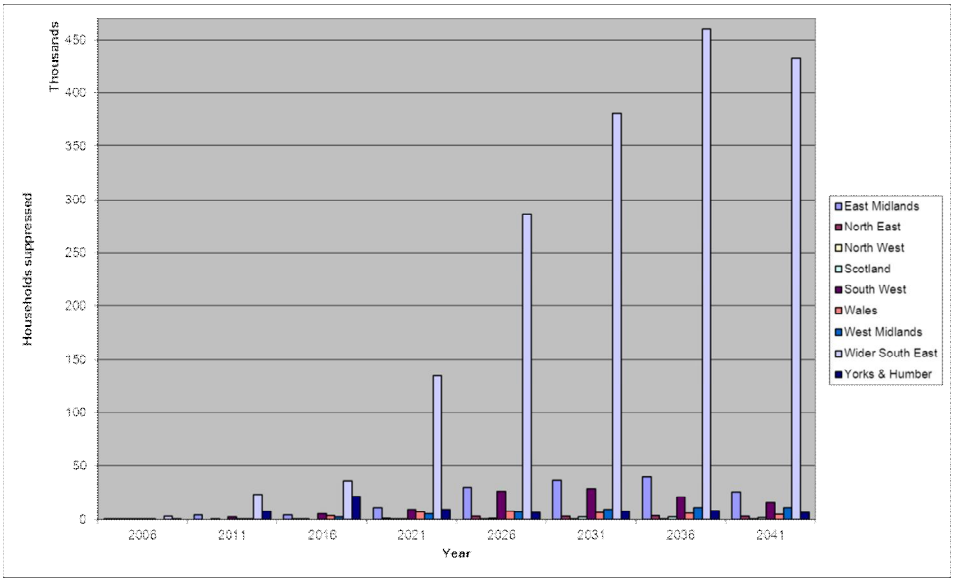

Figure 6.5 Households suppressed

6.2.8 Figure 6.6 shows the number of remaining vacant dwellings after reallocating the initial excess households in each NTEM zone. It can be seen that some areas with relatively high household capacity such as Wider South East has no vacant dwellings left in the later years. This is due to large amount of suppression and reallocation within those regions. On the other hand, Scotland and the North West are among the areas which still have some vacant dwellings left after reallocating of the excess households.

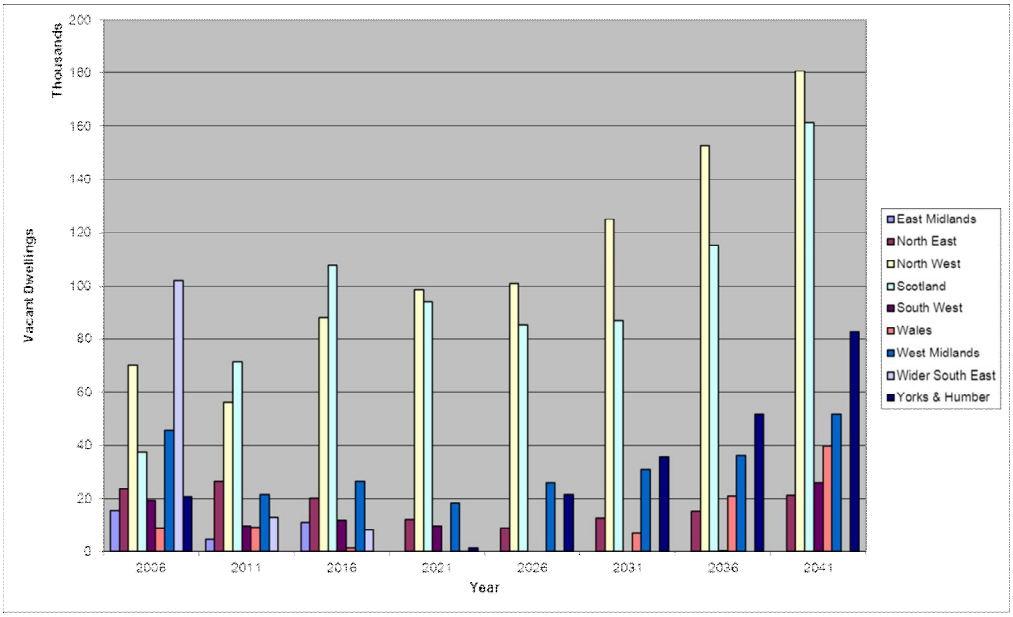

Figure 6.6 Remaining Vacant Dwellings after reallocation process

6.2.9 In general, compared to NTEM 5.4, the housing pressure and so the number of suppressed households is increased substantially, in some locations by around 100%. Overall household and dwellings inputs to the NTEM forecasts for 2041 are both lower in NTEM 6.2 than in NTEM 5.4. In key areas the reduction in dwellings provision is greater than the change in household projections. In the Wider South East for instance, the spare capacity declines to 0 after 2021 resulting in suppressing around 400,000 households in 2041.

6.2.10 It can be seen in the Wider South East and East Midlands in particular that the number of households input for the Region and hence attempted to be allocated is greater than the planned number of household spaces (effectively dwellings) This is indicative of the extrapolated DCLG household projections being greater than the extrapolated policy-based dwellings data. Spare capacity is consumed in the earlier forecast years, resultantly limiting capacity in future years.

6.2.11 In the example of Scotland and the North West, housing pressure is much less than in the South East due to a smoother increasing trend in population and a more than sufficient planned supply of dwellings that meet the projected household input. Therefore there is always spare capacity in this study area and hence minimal household suppression.

RATIO OF WORKERS TO JOBS

6.2.12 The mild declining trend of changes in the ratio of workers to jobs is similar to the one observed in NTEM 5.4. This is because employment forecasts are fairly in line with population forecasts and hence there are sufficient people under pensionable age

to fill the jobs. The profile changes slightly as the employment sectors with different levels of job sharing grow at different rates through time.

6.2.13 As shown in Figure 6.7, the Regions with the lowest ratios of workers to jobs are the Wider South East and, Scotland.

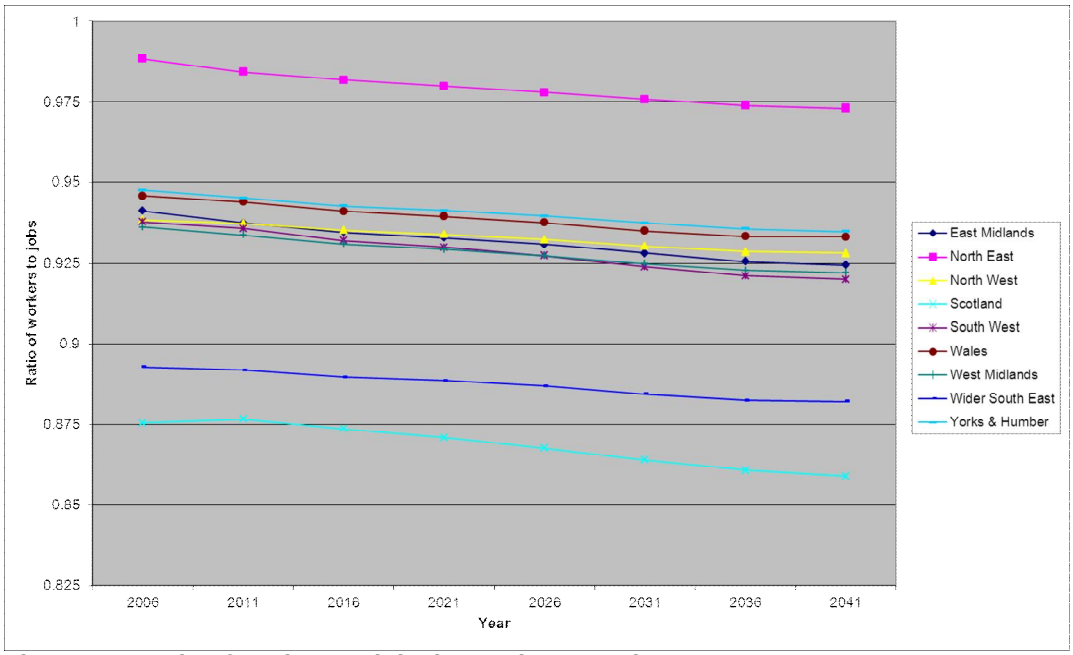

Figure 6.7 Ratio of workers to jobs by Region over time

COMPARISON OF PLANNING DATA OUTPUTS

6.2.14 A comparison has been made between old and new planning data results by comparing the car ownership model target files produced from the Scenario Generator runs. The analyses are shown at the Region and district levels.

6.2.15 At the Great Britain level, there is little change in population and household totals between NTEM 5.4 and 6.2. However, the difference in jobs is more significant. Table 6.1 and Figure 6.8 show this for ten year steps from 2001 to 2041.

6.2.16 The small differences in jobs in 2001 reflect the effect of changes in methodology of estimating the number of base year jobs in NTEM 6.2 (see section 3.5).

Table 6.1 Comparison of planning data for Great Britain, v6.2 and v5.4

Year	Household Population	Jobs	1 Person households	2+ Person households	Total households
NTEM 6.2					
2001	56,405,000	28,505,000	7,222,000	16,685,000	23,907,000
2011	59,679,000	29,831,000	9,083,000	17,024,000	26,107,000
2021	63,746,000	31,576,000	10,868,000	17,876,000	28,744,000
2031	67,392,000	32,591,000	12,567,000	18,448,000	31,015,000
2041	70,337,000	33,911,000	14,245,000	18,763,000	33,008,000
NTEM 5.4					
2001	56,405,000	28,859,000	7,222,000	16,685,000	23,906,000
2011	59,892,000	31,710,000	8,847,000	17,449,000	26,296,000
2021	64,123,000	33,403,000	10,737,000	18,245,000	28,982,000
2031	67,679,000	35,967,000	12,776,000	19,184,000	31,960,000
2041	71,167,000	38,684,000	15,207,000	20,224,000	35,431,000
Absolute difference (v6.2 – v5.4)					
2001	0	-354,000	0	0	1,000
2011	-213,000	-1,879,000	236,000	-425,000	-189,000
2021	-377,000	-1,827,000	131,000	-369,000	-238,000
2031	-287,000	-3,376,000	-209,000	-736,000	-945,000
2041	-830,000	-4,773,000	-962,000	-1,461,000	-2,423,000
Relative difference (%)					
2001	0.00%	-1.23%	0.00%	0.00%	0.00%
2011	-0.36%	-5.93%	2.67%	-2.44%	-0.72%
2021	-0.59%	-5.47%	1.22%	-2.02%	-0.82%
2031	-0.42%	-9.39%	-1.64%	-3.84%	-2.96%
2041	-1.17%	-12.34%	-6.33%	-7.22%	-6.84%

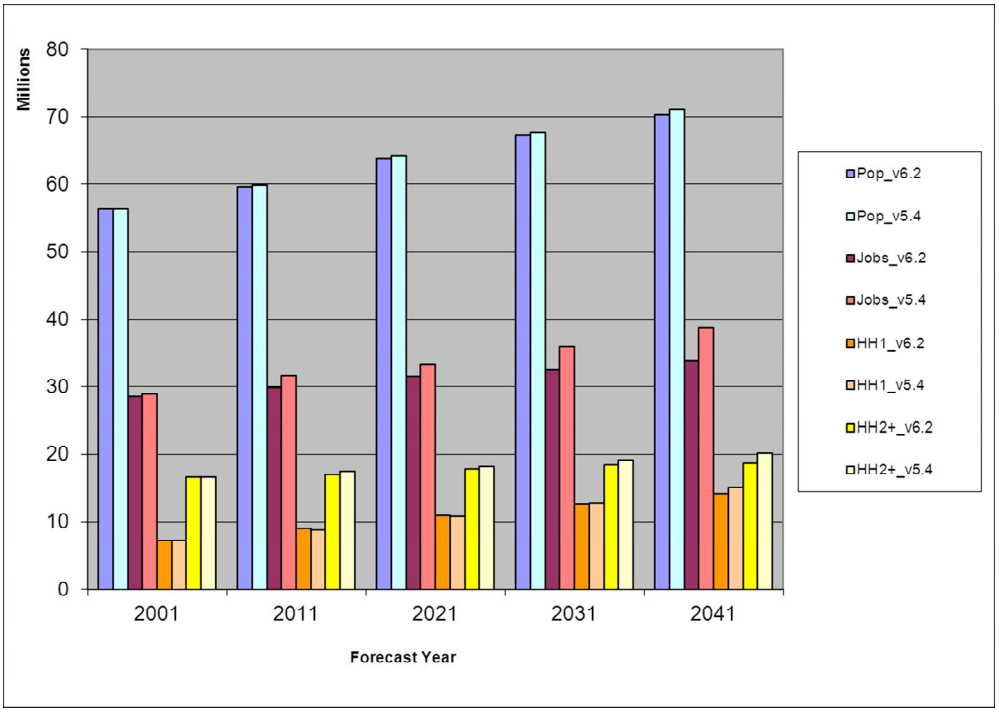

Figure 6.8 Comparison of planning data output totals, v6.2 versus v5.4

6.2.17 The following observations can be made:

- Total population was slightly higher in v5.4 than v6.2 in the later forecast years, while it is the same in the base year in both versions. This is also the case for the number of one person and 2+ person households.
- Total employment is lower in v6.2 compared to v5.4 in both base and future years specifically in the later forecast years.

6.2.18 Figure 6.9 shows differences between versions at the Regional level for 2021. This is a comparison between the National Car Ownership Model target file as output by the Scenario Generator. Employment in the chart is defined as people of working age in employment.

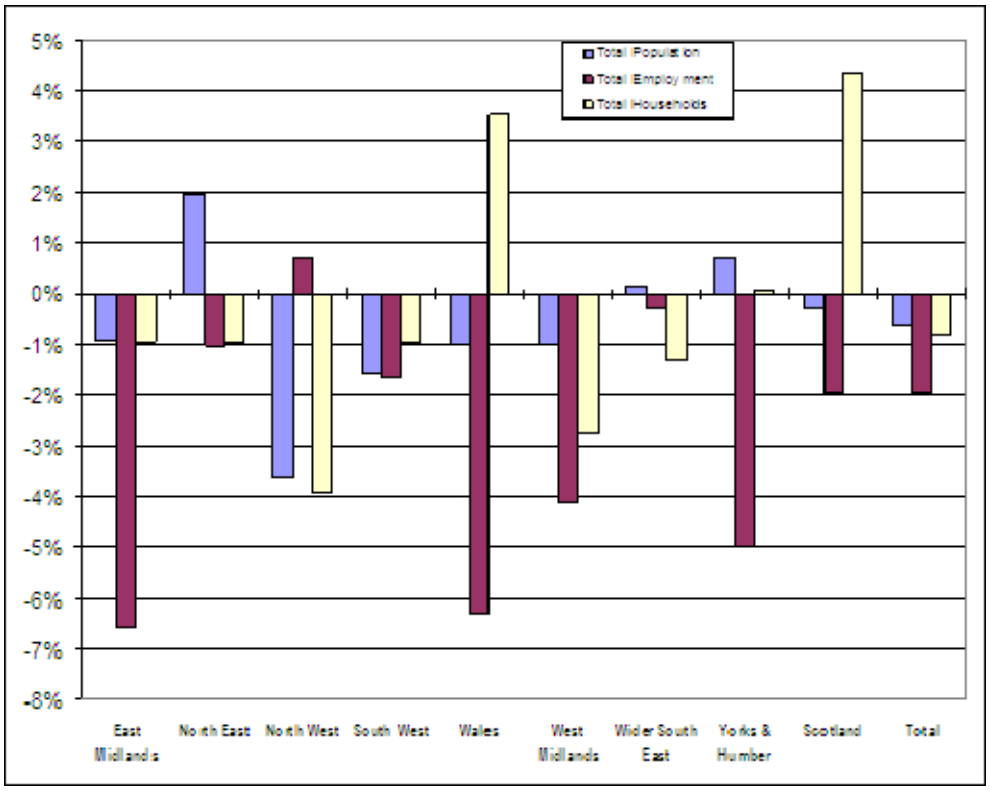

Figure 6.9 Relative difference in population, households and employed persons in 2021 (NTEM 6.2 planning data versus NTEM 5.4)

6.2.19 Most Regions on the whole show some discrepancies between the two planning data versions specifically for employment. Figure 6.10 below shows absolute differences in key demographic variables by Region. An observation of note is that the male FT and PT and female FT employment is lower across the board than in the previous planning data. In Wider South East, this reduction is more significant. Overall total population in 2021 in Great Britain is lower by only 377,000 while the number in employment is lower by 573,000. The absolute difference is 238,000 for total number of households.

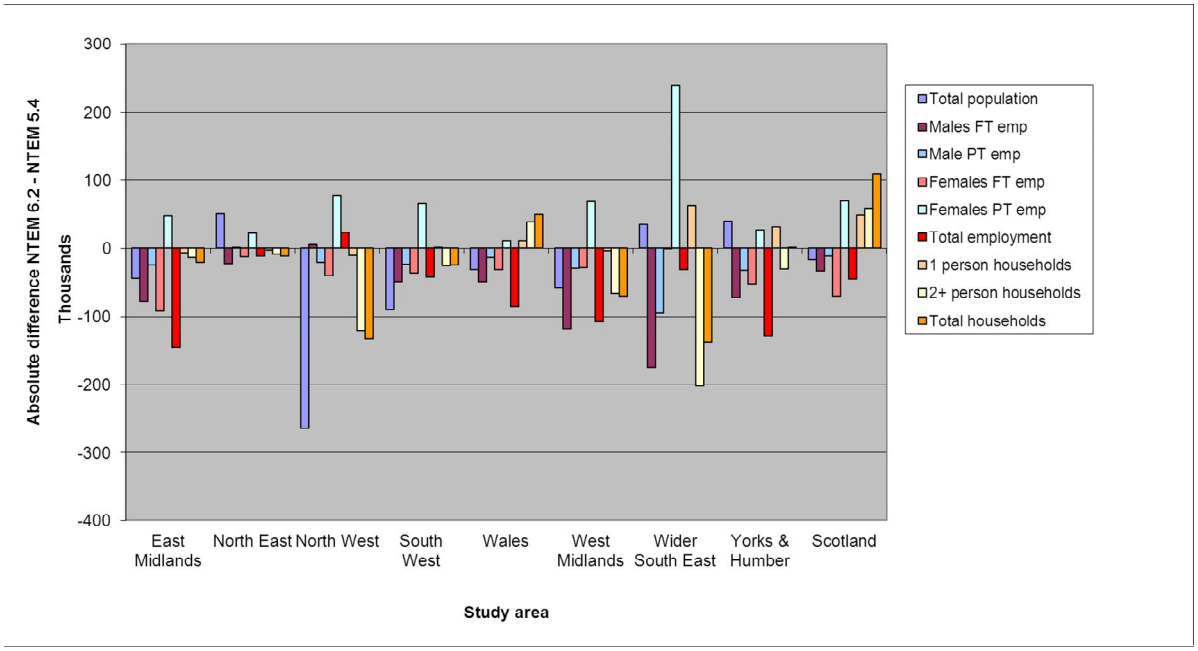

Figure 6.10 Absolute difference in population, households and employed persons in 2021 (NTEM 6.2 planning data versus NTEM 5.4, thousands)

6.2.20 Growth in NTEM zone level demographic variables show some differences, as shown in the Figures below for population, households and employment growth. As a result, users of the planning data – and ultimately the trip end data – may find some differences between NTEM 6.2 and NTEM 5.4. This is especially the case where zone level data is used.

6.2.21 The population growth presented in Figure 6.11 should be largely in line with the ONS population projections at the control area level. This will vary, however, where population is moved across each Region through the household allocation process. The spatial variability is similar between the two versions. The growth rate from 2011 to 2031 in general is lower on the north coast of Cornwall and the North West, particularly the lake district, and slightly higher in the south west of Wales and the highlands of Scotland in NTEM V6.2 compared to that in NTEM V5.4.

Household growth shown in Figure 6.12 displays more differences between the two versions compared to growth in population. The growth rate is higher in Scotland and parts of the South West, where household capacity was more and household suspension was lower (refer to

6.2.22 Figure 6.4 and Figure 6.5) and lower in the North West due to the lower population, and in the South East due to limited dwelling provision.

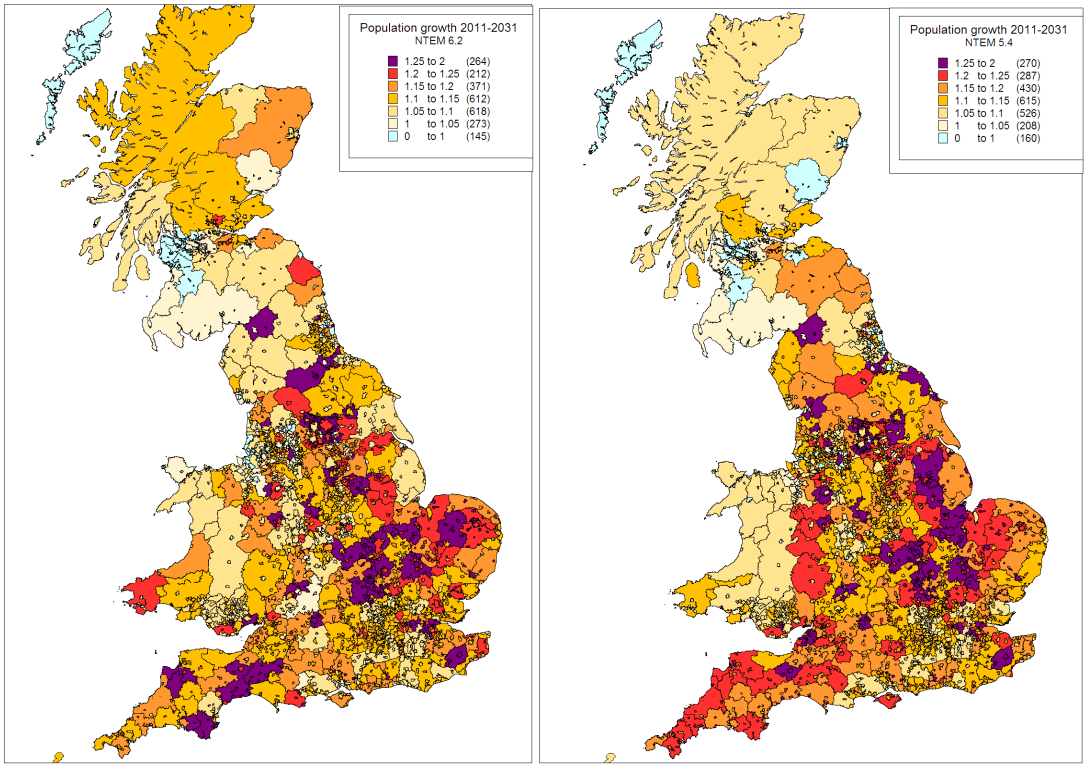

Figure 6.11 Growth in total population 2011-2031 by zone in NTEM 6.2 (left) and NTEM 5.4 (right)

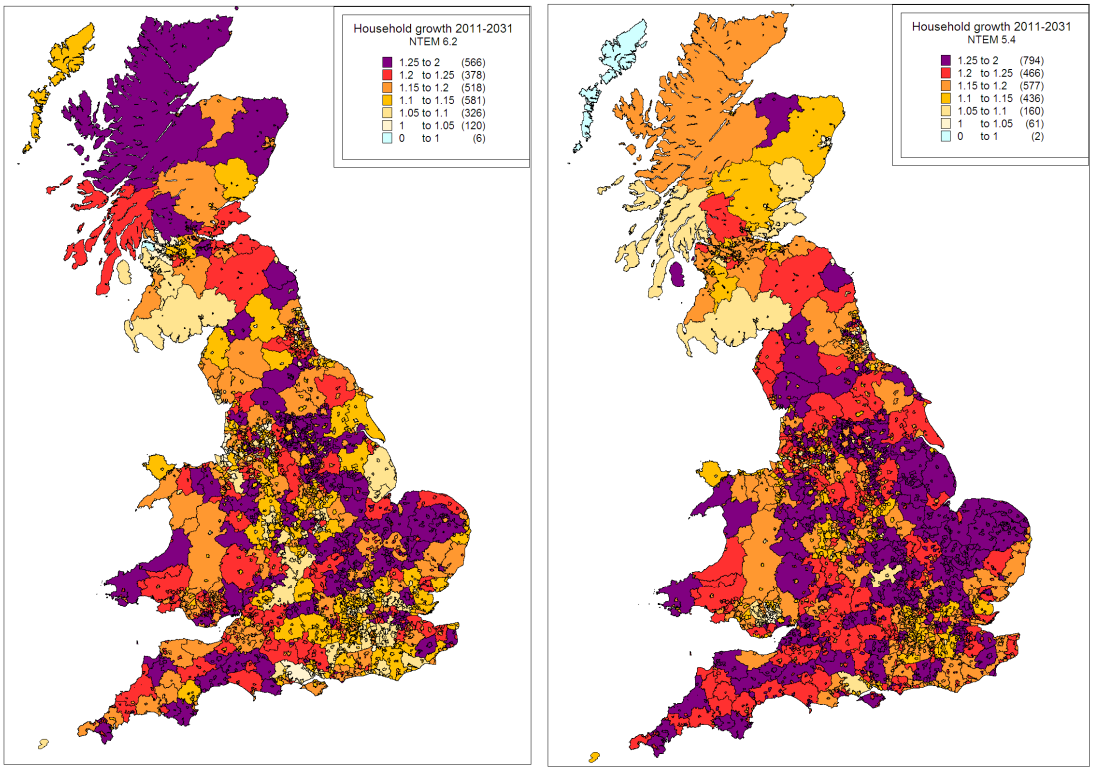

Figure 6.12 Growth in total households 2011-2031 by zone in NTEM 6.2 (left) and NTEM 5.4 (right)

6.2.23 Employment levels demonstrate significant differences between the two versions. Figure 6.13 shows the difference in the growth rate between 2011 and 2031. NTEM 6.2 shows the general trend of much lower growth in employment in the whole GB, particularly the in the south of England compared to NTEM 5.4. A few areas are still forecast to grow quite strongly including parts of Wales and South Cambridgeshire.

6.2.24 The main cause of this lower level of growth in NTEM 6.2 is that the national employment growth forecast has been altered in line with the economic downturn.

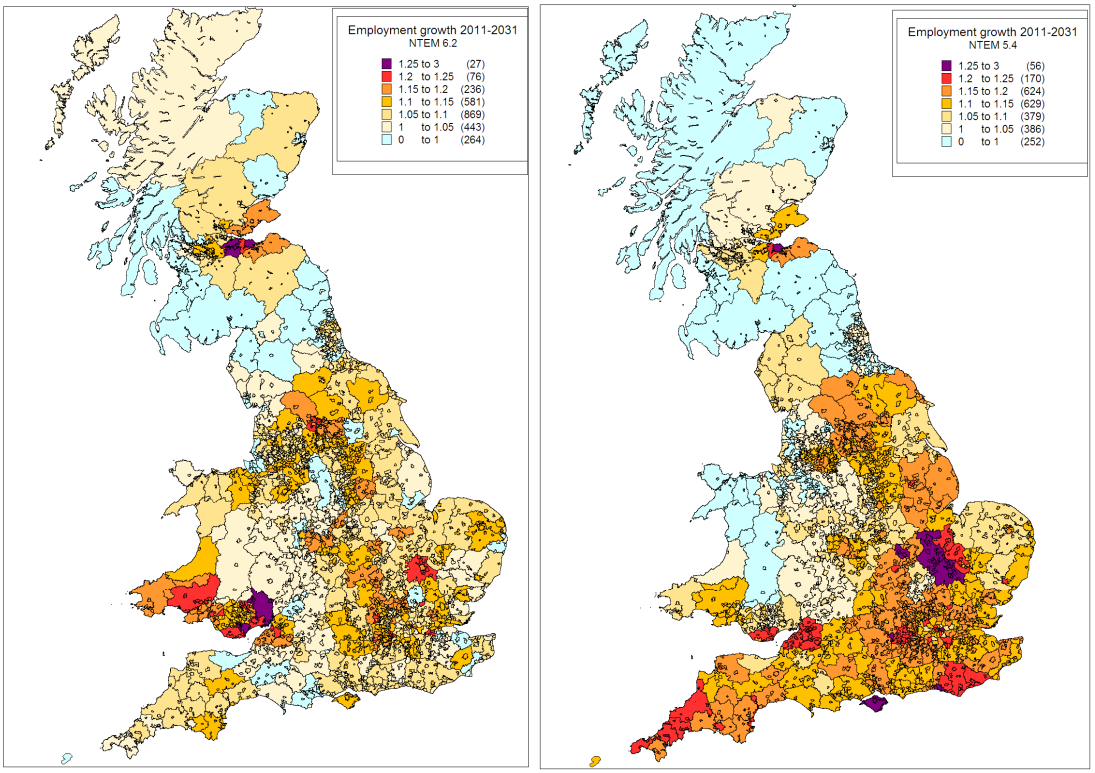

Figure 6.13 Relative difference in total employment (jobs) by zone, 2011 – 2031; NTEM 6.2 (left) and NTEM 5.4 (right)

6.3 NATIONAL CAR OWNERSHIP MODEL

GREAT BRITAIN COMPARISONS

6.3.1 The table and chart below show the comparison between old and new car ownership forecasts for Great Britain. These show that the different versions of car ownership data compare relatively well: there have been no significant changes to the car ownership model other than revised purchase costs and GDP. Version 6.2 has a slightly lower proportion of households without a car and a greater proportion of one-car households.

6.3.2 Regional level car ownership profiles reflect a very similar trend to the Great Britain profile.

Table 6.2 Household car ownership in Great Britain, v6.2 versus v5.4

	Household owning x cars							
	Absolute Values (thousands)				**Proportions (%)**			
Year	**0 cars**	**1 car**	**2 cars**	**3+ cars**	**P0**	**P1**	**P2**	**P3P**
Version 5.4								
2001	6,578	10,464	5,508	1,357	28%	44%	23%	6%
2006	6,497	11,138	5,898	1,512	26%	44%	24%	6%
2011	6,332	11,875	6,410	1,679	24%	45%	24%	6%
2016	6,335	12,566	6,847	1,811	23%	46%	25%	7%
2021	6,433	13,343	7,282	1,924	22%	46%	25%	7%
2026	6,541	14,019	7,653	2,049	22%	46%	25%	7%
2031	6,737	14,993	8,085	2,145	21%	47%	25%	7%
2036	6,830	15,947	8,555	2,275	20%	47%	25%	7%
2041	7,022	17,033	9,013	2,363	20%	48%	25%	7%
Version 6.2								
2001	6,474	10,466	5,586	1,381	27%	44%	23%	6%
2006	5,838	11,366	6,120	1,579	23%	46%	25%	6%
2011	5,908	12,319	6,298	1,582	23%	47%	24%	6%
2016	5,713	13,207	6,806	1,727	21%	48%	25%	6%
2021	5,860	13,917	7,149	1,817	20%	48%	25%	6%
2026	5,940	14,512	7,486	1,950	20%	49%	25%	7%
2031	6,016	15,133	7,802	2,064	19%	49%	25%	7%
2036	6,036	15,705	8,129	2,209	19%	49%	25%	7%
2041	6,010	16,157	8,453	2,388	18%	49%	26%	7%
Comparison: v6.2-5.4								
2001	-104	2	78	24	-0.4%	0.0%	0.3%	0.1%
2006	-660	227	222	67	-2.5%	1.2%	1.0%	0.3%
2011	-424	444	-111	-97	-1.5%	2.0%	-0.3%	-0.3%
2016	-622	641	-41	-84	-2.2%	2.5%	-0.1%	-0.3%
2021	-573	574	-133	-106	-1.8%	2.4%	-0.3%	-0.3%
2026	-601	493	-167	-99	-1.7%	2.2%	-0.2%	-0.2%
2031	-721	140	-283	-81	-1.7%	1.9%	-0.1%	-0.1%
2036	-793	-242	-427	-66	-1.5%	1.5%	-0.1%	0.1%
2041	-1,012	-876	-560	25	-1.6%	0.9%	0.2%	0.6%

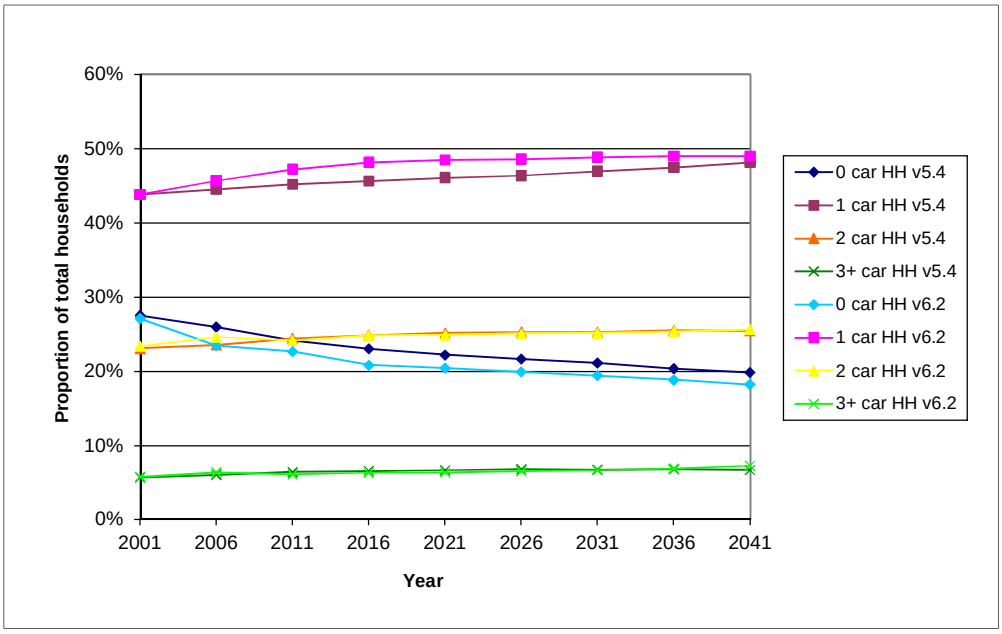

Figure 6.14 Car ownership through time (v6.2 versus v5.4)

6.3.3 Figure 6.15 shows the average number of cars per household in each district in 2031. More dense urban areas tend to have fewer cars per household than districts outside of metropolitan areas. The Wider South East outside of Greater London has the highest level of car ownership. The pattern between the two versions is broadly similar.

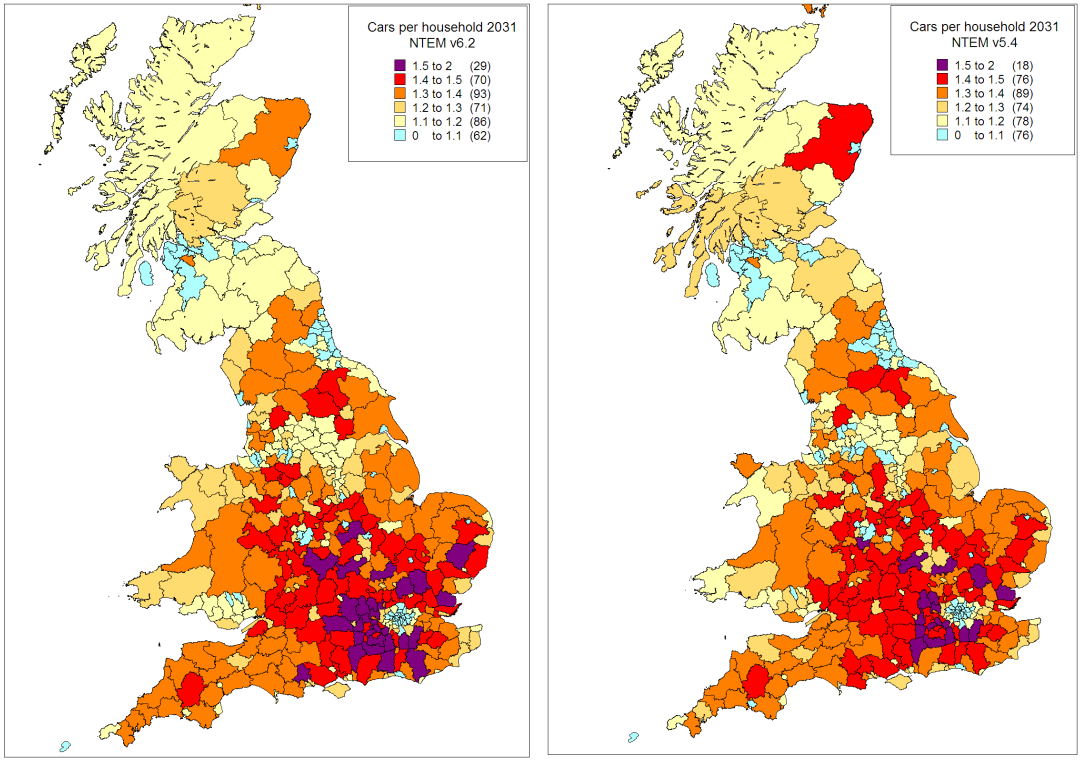

Figure 6.15 Cars per household 2031 by zone, NTEM 6.2 (left) and NTEM 5.4 (right)

DISTRICT LEVEL COMPARISONS

6.3.4 District level maps of the change in households by cars owned can be seen in Figure 6.16. This demonstrates the general trend of increased car ownership through time across Great Britain, with greater levels of growth in higher car owning households.

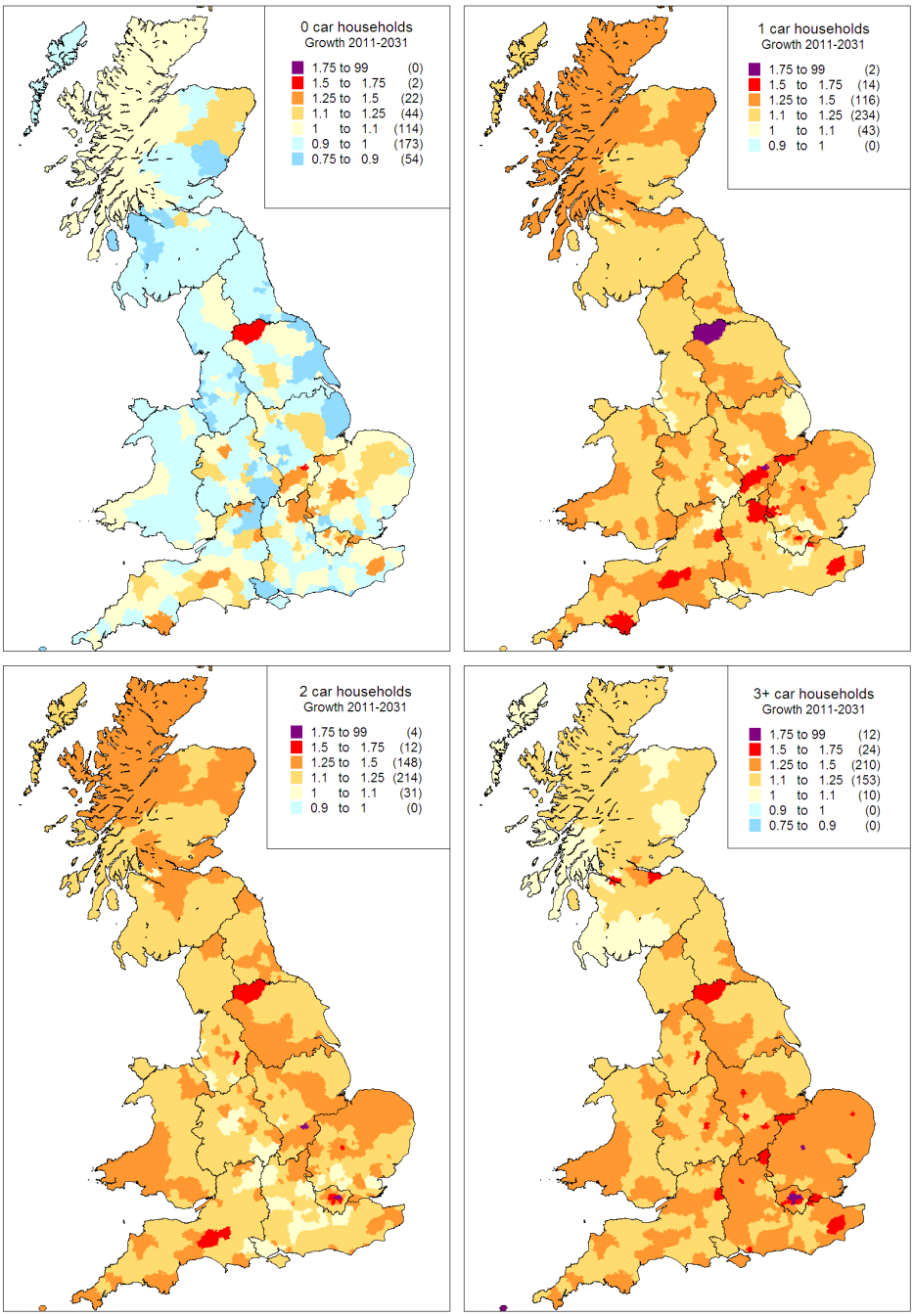

Figure 6.16 District growth in households by car ownership, 2011-2031, NTEM 6.2

6.3.5 NTEM 6.2 does show some differences in household car ownership proportions when compared to v5.4. This comparison is shown in the maps in Figure 6.17. As

demonstrated at a global level, most areas experience a decline in the proportion of households without a car and an increase in the proportion with 1 car. The spatial pattern of changes for the households with two and three or more cars is more mixed though the changes are relatively small.

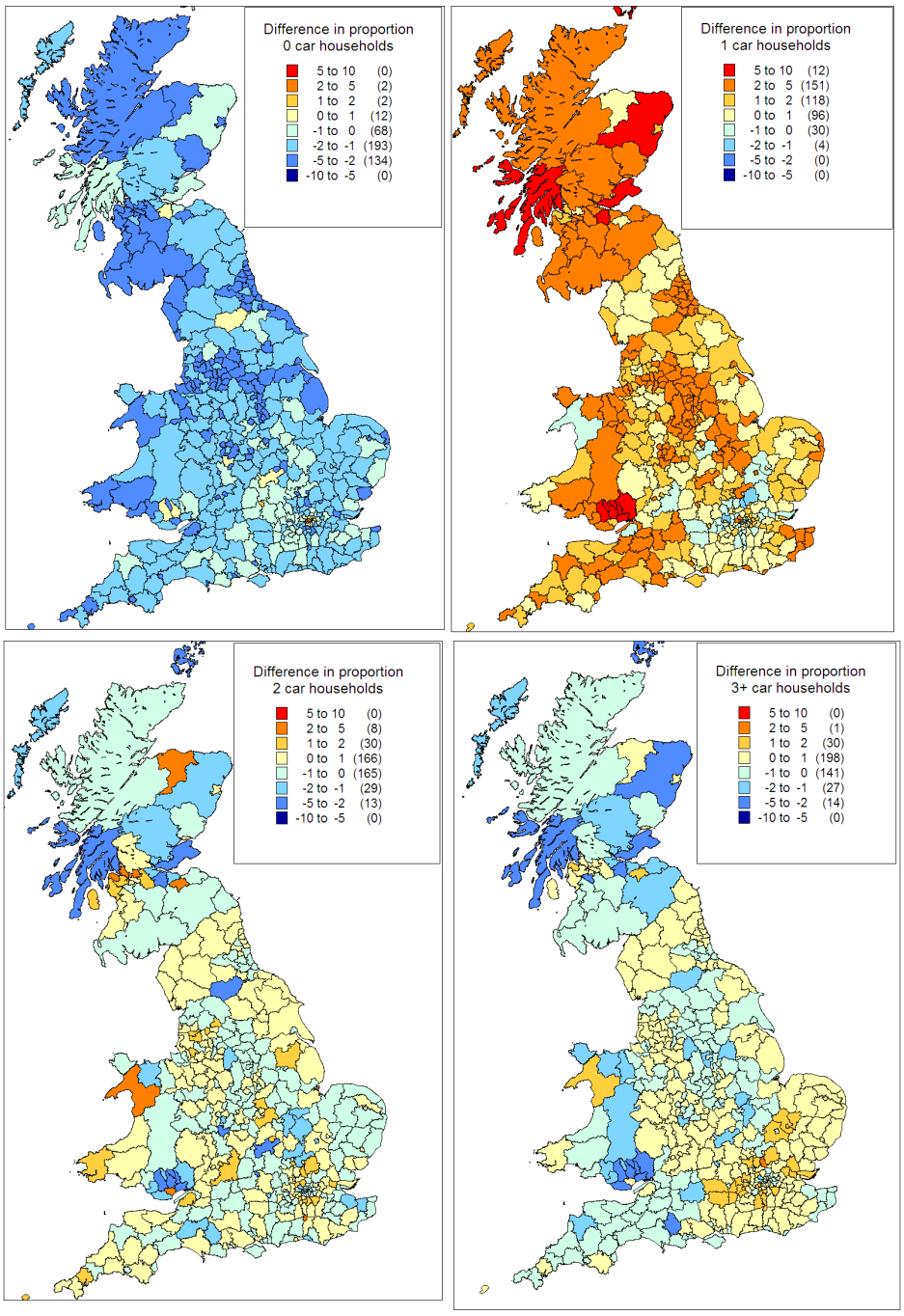

Figure 6.17 Difference in proportion of household car ownership 2031 by zone between NTEM versions (v6.2 proportion minus v5.4 proportion of total households)

6.4 NATIONAL TRIP END MODEL

COMPARISON OF TOTAL TRIPS

6.4.1 The National Trip End Model gives details of trip productions and attractions that are ultimately made available through the TEMPRO system. Several differences exist between the previous and latest versions of the data. In summary, the volume of trips made in NTEM 6.2 is slightly less in the later forecast years than in the previous version. This is due to lower population and the overall decrease in employment in NTEM 6.2.

6.4.2 District and zone level trip patterns may also differ to a large extent due to variations in dwellings and household allocation and employment locations from the previous version.

Table 6.3 Comparison of total trip productions for Great Britain between v6.2 and v5.4 (millions per average day)

Version	2001	2006	2011	2016	2021	2026	2031	2036	2041
NTEM 6.2	93.9	97.5	100.5	104.2	107.5	110.7	113.4	115.9	118.7
NTEM 5.4	93.6	96.5	100.7	104.4	107.9	111.0	113.9	117.0	120.4
Difference	0.4	0.9	-0.1	-0.2	-0.3	-0.3	-0.6	-1.1	-1.7
% Difference	0.4%	1.0%	-0.1%	-0.2%	-0.3%	-0.2%	-0.5%	-0.9%	-1.4%

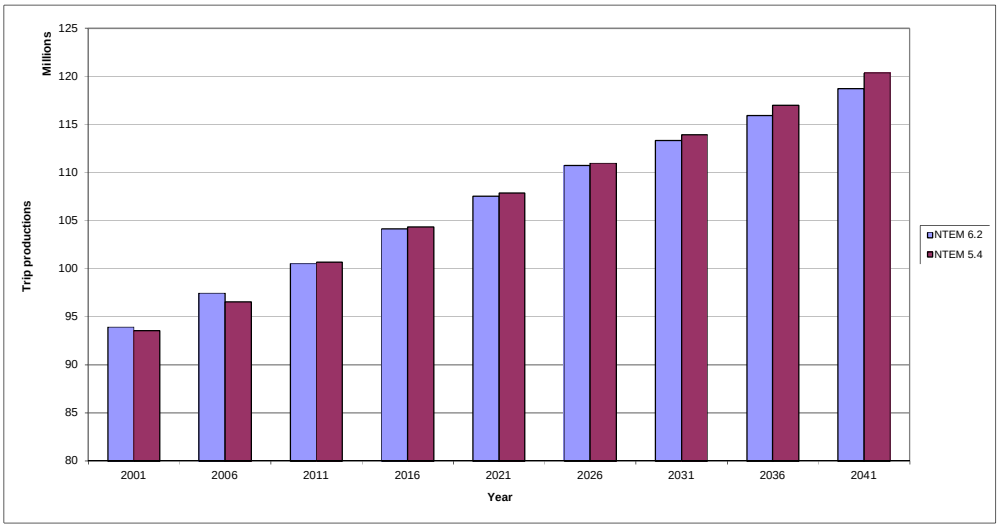

Figure 6.18 Change in Trip Productions over time: NTEM 6.2 v NTEM 5.4 (millions)

6.4.3 Comparing total trips from the National Trip End Model between the two versions, it is evident that version 6.2 has only slightly less.

- The main reason for less number of trips in the latest version of NTEM could be mainly related to lower population and to using revised version of employment projection data which predict considerably less number of jobs compared to that provided in the employment projection data used for NTEM V5.4. Trip rates vary by working status hence the trip end forecasts adjust in line with employment changes.

TRIPS BY PURPOSE

6.4.4 Figure 6.19 shows the trend in trips made by purpose through time for an average day.

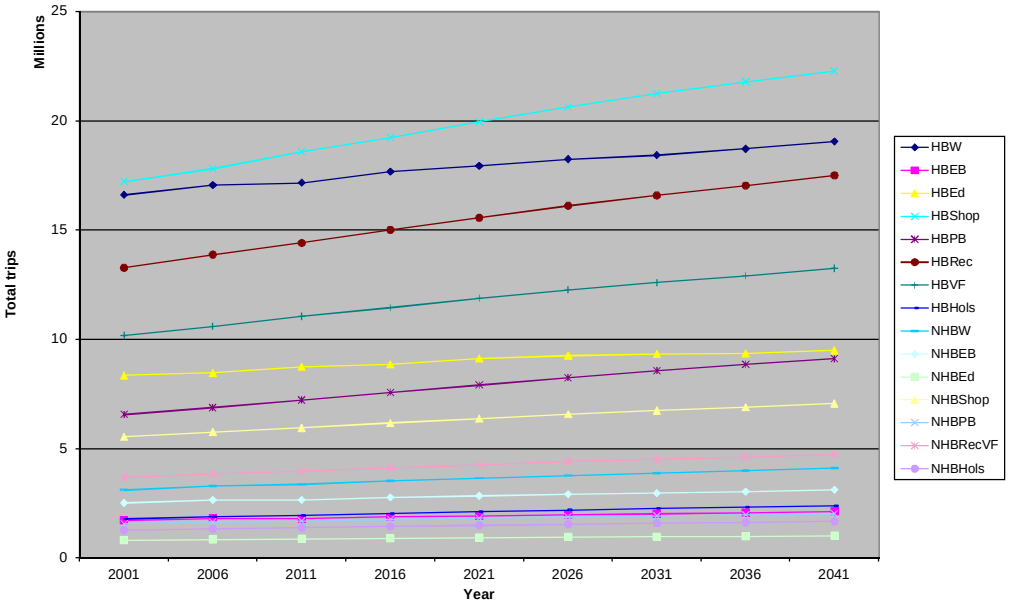

Figure 6.19 Total trips in the average day by purpose in Great Britain, NTEM 6.2

6.4.5 In NTEM 6.2, as with NTEM 5.4, most trip purposes show an increase in the number of trips through time, due to the population increases. Some purposes such as HBW and HBEB show a dip in total number of trips between 2006 and 2011, a result of the economic downturn.

6.4.6 Figure 6.20 shows the proportional change in trips made in an average day by purpose over time between NTEM 5.4 and NTEM 6.2. This clearly shows that unlike the small difference in number of trips over all purposes, the purpose by purpose difference is quite significant specifically for home based and non home based work and business and education purposes.

6.4.7 As expected the difference is biggest in 2011 as the number of trips is estimated to be less for work and business trips and more for education trips. This difference has then become smaller for the later forecast years.

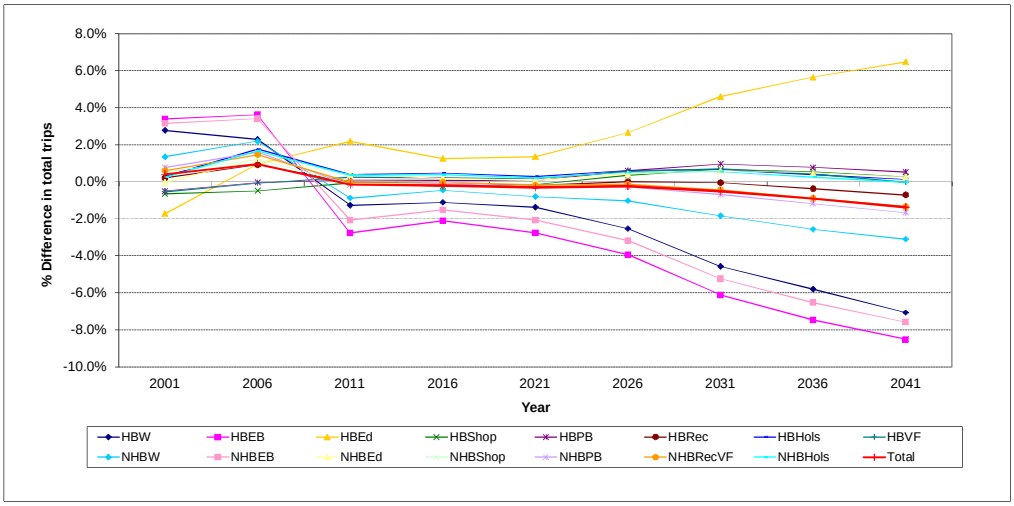

Figure 6.20 Relative difference in total trips by purpose over time in Great Britain; NTEM 6.2 v NTEM 5.4

AVERAGE TRIPS PER HOUSEHOLD

6.4.8 The trends in the average number of trips per household in the two versions are shown in Figure 6.21 and Figure 6.22 below. Both data sets show a similar decrease in the number of trips.

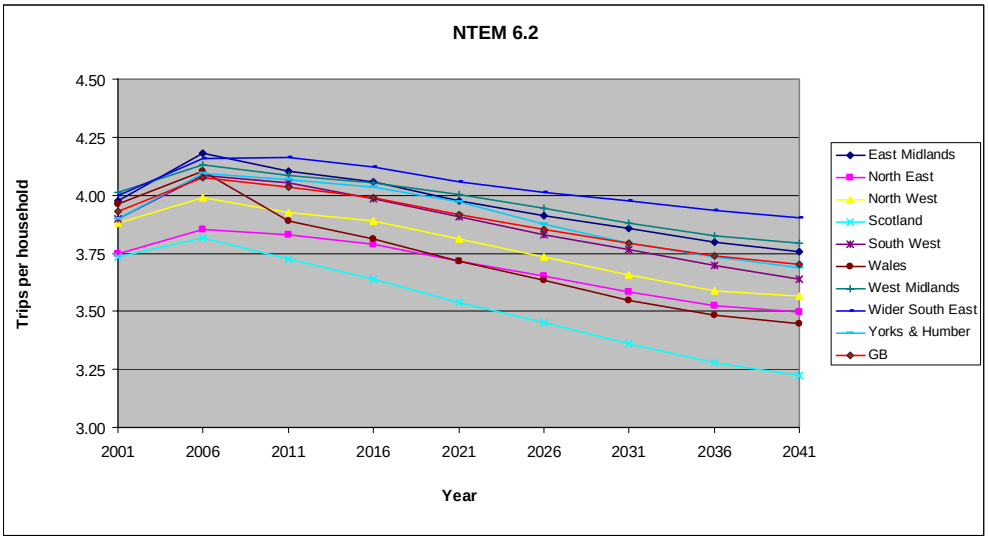

Figure 6.21 Trips per households by study area in the average day, NTEM 6.2

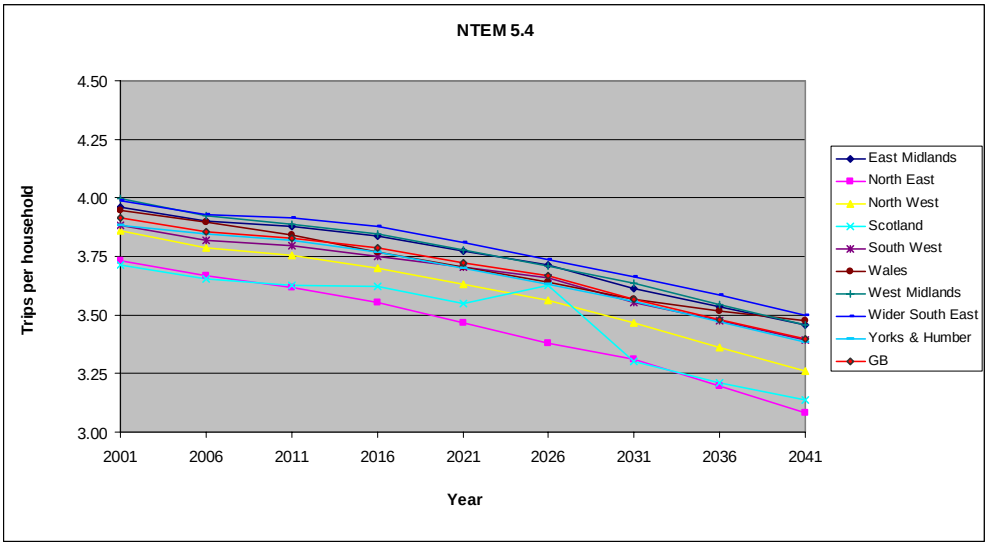

Figure 6.22 Trips per households by study area in the average day, NTEM 5.4

AVERAGE TRIPS PER PERSON

6.4.9 Trips per person in each study area have a slight upward trend over time after the dip in 2011. Overall change however is minimal since trip rates have not been modified through time.

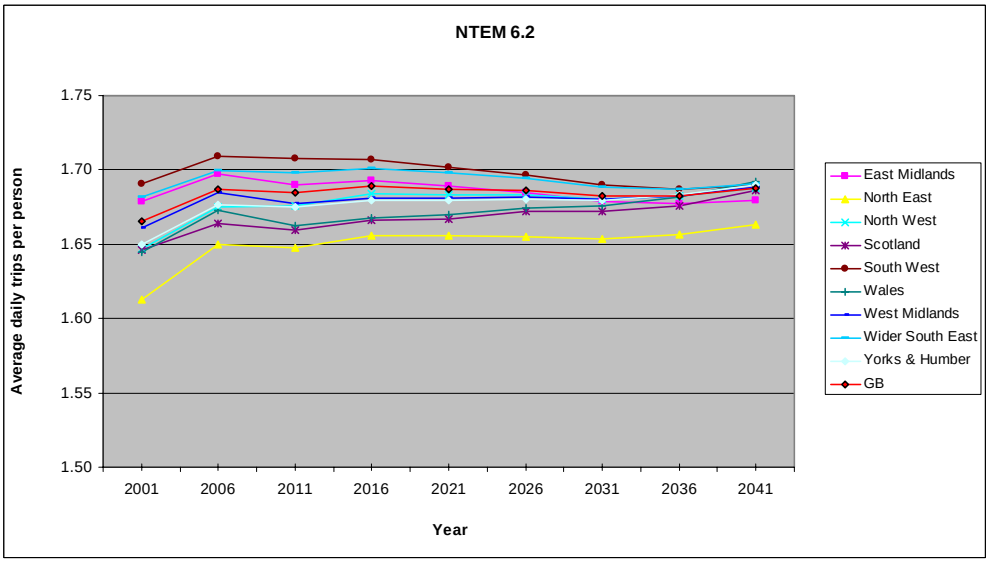

Figure 6.23 Trips per person by study area in the average day, NTEM v6.2

COMPARISON OF TRIP PRODUCTIONS AND ATTRACTIONS

6.4.10 Figure 6.24 below shows a comparison of the total trip productions and attractions (summed over all modes) at the district level from the trip end model results between NTEM 5.4 and NTEM 6.2.

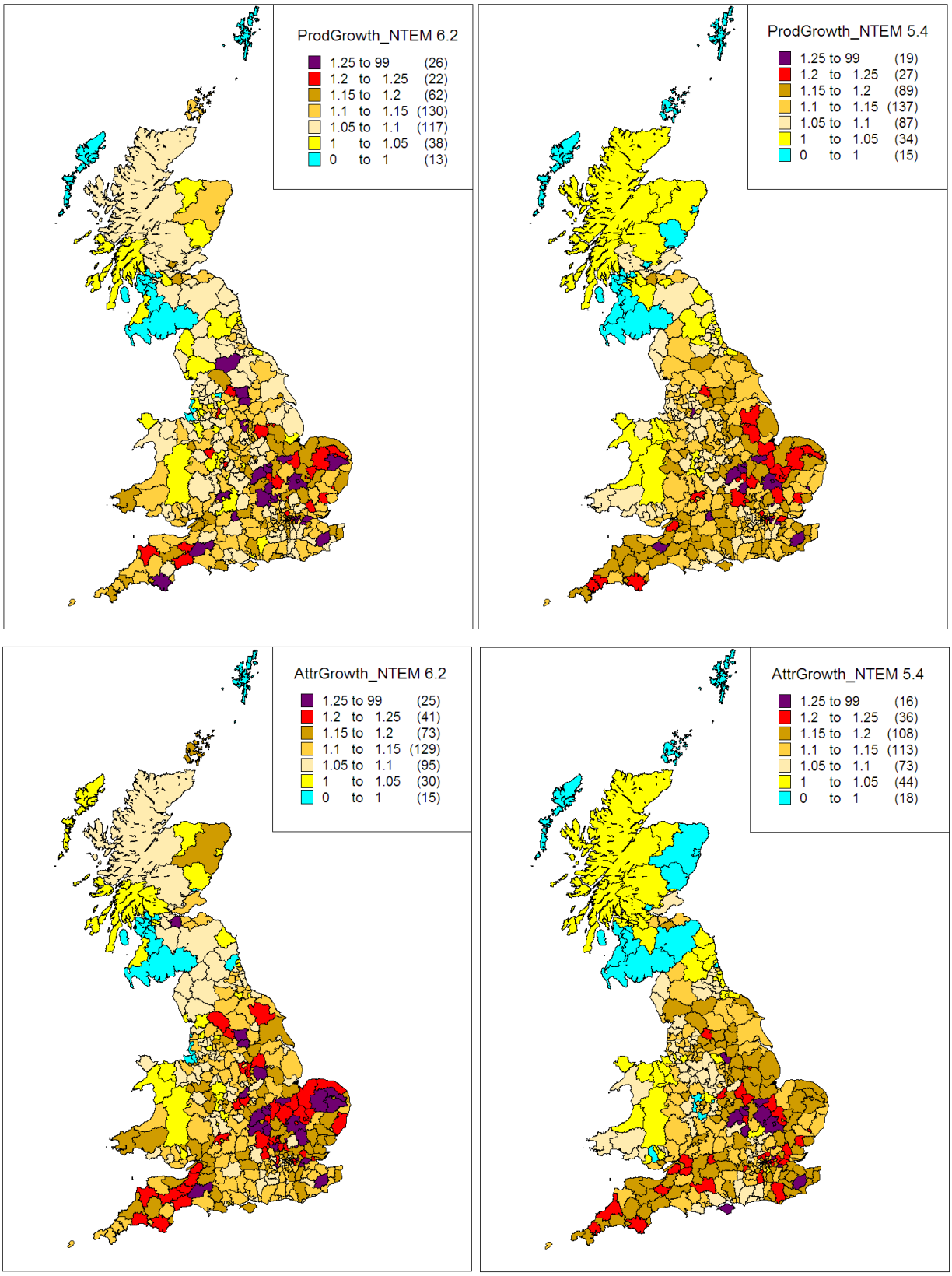

Figure 6.24 Growth in trip productions and attractions by district, 2011-2031, comparison between versions

6.4.11 Figure 6.25 below compares the rate of growth through time in trip ends by mode in NTEM 6.2 compared with NTEM 5.4. It should be remembered that the mode split in NTEM is a constant cost mode split which ignores any changes in the costs of motoring (fuel and taxation) and public transport fares. These need to be taken into account separately when using modal NTEM forecasts. This shows that the car trips continue to have the highest rate of growth through time, though the rate of growth in NTEM 6.2 is lower than seen previously in NTEM 5.4. Bus travel continues to have the lower rate of growth through time, though increased on the previous version. These changes will be driven primarily by the forecast changes in car ownership.

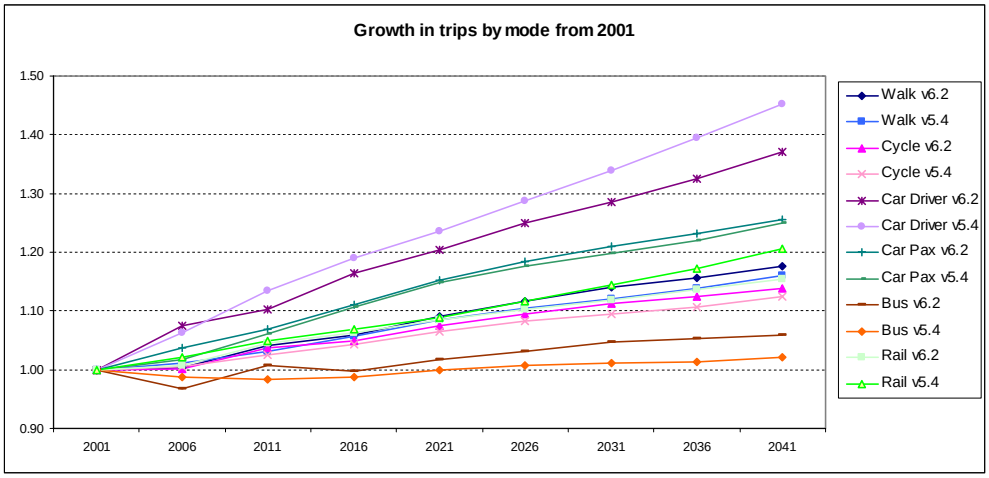

Figure 6.25 Rate of growth of modal trip ends (NTEM 6.2 v NTEM 5.4)

Appendices, Figures & Tables

Appendix A Geography

BALANCING AREAS

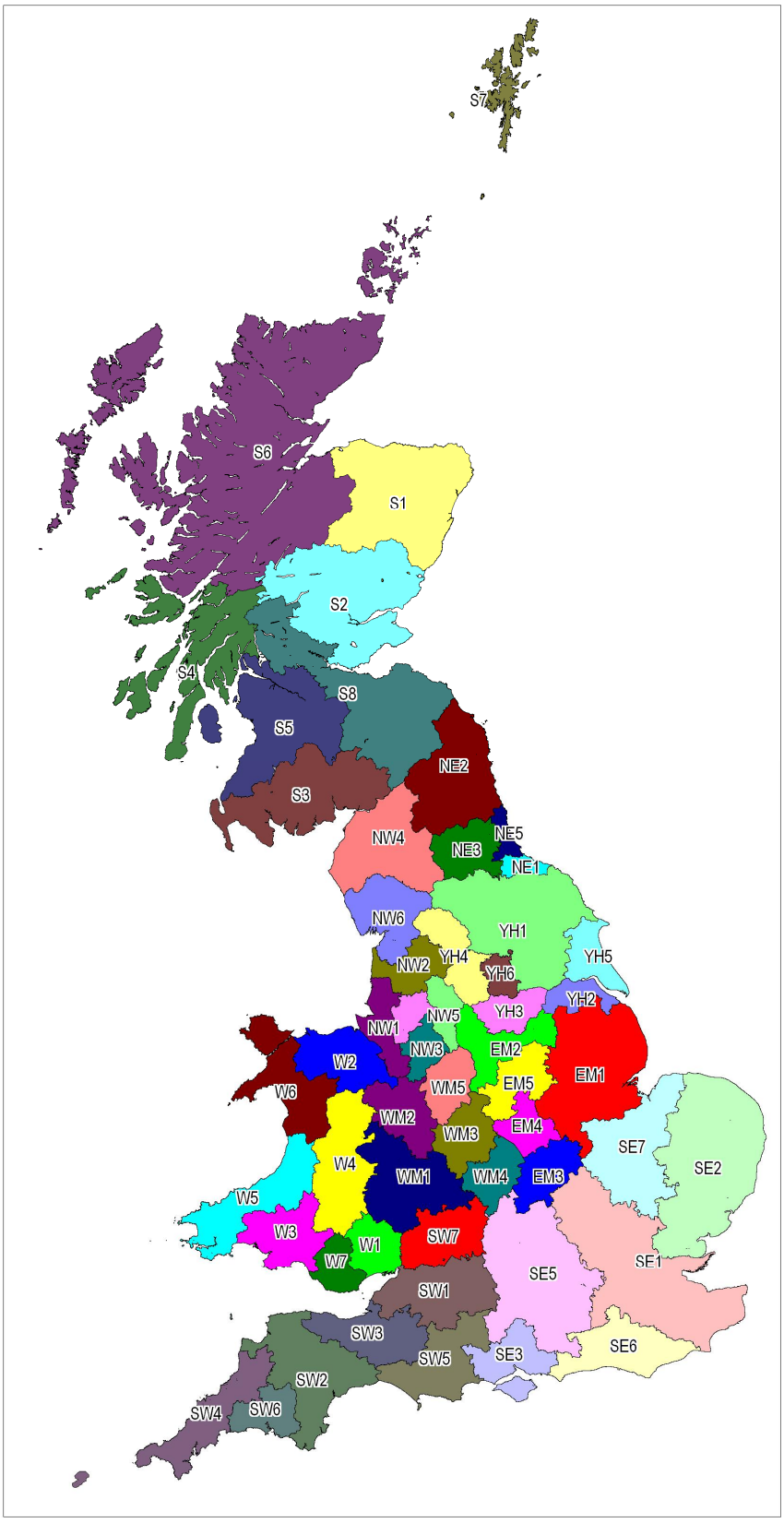

Figure A.1 Balancing areas in Great Britain

STUDY AREAS AND NTEM ZONES

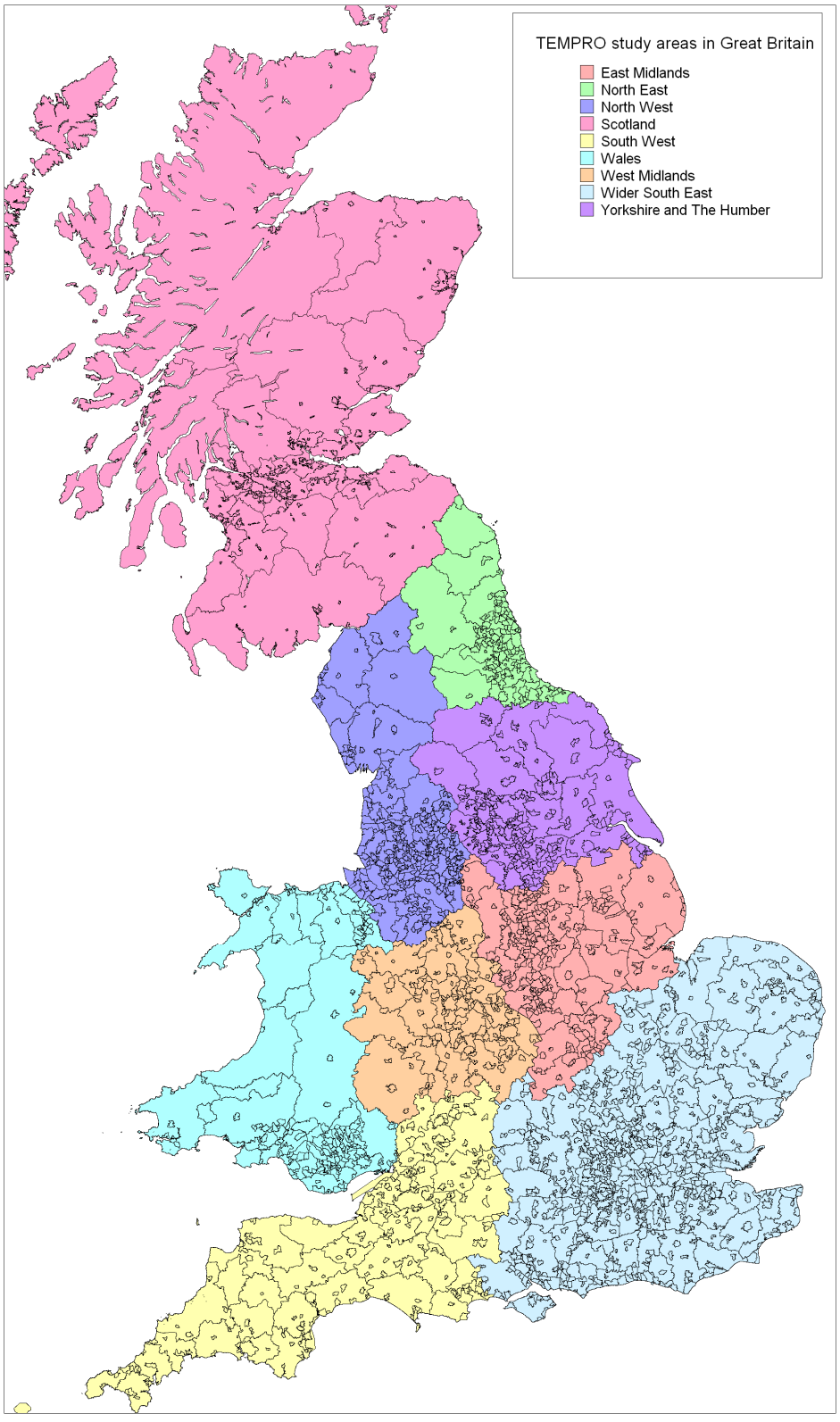

Figure A.2 Study areas used in the Scenario Generator and overlaid NTEM zones.
NB All Scottish islands are also included but may appear off the map

Table A.1 NTEM zones within each study area

Zone	Code	ZoneName	Zone	Code	ZoneName	Zone	Code	ZoneName
East Midlands			1590	31UB4	Whetstone	1669	32UF4	Long Sutton
454	00FK0	rural	1591	31UB5	Cosby	1670	32UF5	Crowland
455	00FK1	Derby(main)	1592	31UB6	Earl Shilton(part of)	1671	32UF6	Sutton Bridge
456	00FN0	rural	1593	31UB7	Enderby	1672	32UG0	rural
457	00FN1	Leicester(main)	1594	31UB8	Narborough	1673	32UG1	Grantham
458	00FN2	Beaumont Leys	1595	31UB9	Countesthorpe	1674	32UG2	Great Gonerby
459	00FP0	rural	1596	31UC0	rural	1675	32UG3	Stamford
460	00FP1	Oakham	1597	31UC1	Leicester(part of)	1676	32UG4	Market Deeping(main)
461	00FP2	Uppingham	1598	31UC10	Markfield(part of)	1677	32UG5	Bourne
462	00FY1	Nottingham(main)	1599	31UC11	Quorndon	1678	32UH0	rural
463	00FY2	Clifton	1600	31UC2	Birstall	1679	32UH1	Lincoln(part of)
464	00FY3	West Bridgford(part of)	1601	31UC4	Loughborough	1680	32UH2	Gainsborough
465	00FY4	Carlton(part of)	1602	31UC5	Shepshed	1681	32UH3	Welton/Dunholme
987	17UB0	rural	1603	31UC6	Mountsorrel	1682	32UH4	Saxilby
988	17UB00	rural	1604	31UC7	Sileby	1683	32UH5	Cherry Willingham/Reepham
989	17UB1	Heanor	1605	31UC8	Anstey	1684	32UH6	Nettleham
990	17UB2	Ripley	1606	31UC9	Barrow upon Soar	1685	32UH7	Market Rasen
991	17UB3	Derby(part of)	1607	31UD0	rural	1734	34UB0	rural
992	17UB4	Alfreton	1608	31UD1	Leicester(part of)	1735	34UB1	Corby
993	17UB5	Jacksdale(part of)	1609	31UD2	Market Harborough	1736	34UC0	rural
994	17UB6	Belper	1610	31UD3	Lutterworth	1737	34UC1	Northampton(part of)
995	17UB7	Duffield	1611	31UD4	Broughton Astley	1738	34UC2	Daventry
996	17UB8	Kiburn	1612	31UD5	Kibworth Harcourt	1739	34UC3	Brixworth
997	17UC0	rural	1613	31UD6	Fleckney	1740	34UC4	Long Buckby
998	17UC2	Mansfield(part of)	1614	31UE0	rural	1741	34UC5	Hinton
999	17UC3	South Normanton/Pinxton(main)	1615	31UE1	Groby	1742	34UD0	rural
1000	17UC4	Bolsover	1616	31UE2	Ratby	1743	34UD00	rural
1001	17UC5	Shirebrook	1617	31UE3	Hinckley	1744	34UD1	Rushden(main)
1002	17UC6	Clowne	1618	31UE4	Earl Shilton(main)	1745	34UD2	Higham Ferrers
1003	17UC7	Creswell	1619	31UE5	Atherstone(part of)	1746	34UD3	Raunds
1004	17UC8	Whitwell nr Worksop	1620	31UE6	Markfield(main)	1747	34UD4	Irthlingborough
1005	17UC9	Tibshelf	1621	31UE7	Desford	1748	34UD5	Oundle
1006	17UD0	rural	1622	31UE8	Newbold Verdon	1749	34UD6	Thrapston
1007	17UD1	Chesterfield(main)	1623	31UG0	rural	1750	34UE0	rural
1008	17UD2	Staveley(main)	1624	31UG1	Melton Mowbray	1751	34UE1	Kettering
1009	17UD3	New Whittington	1625	31UG2	Bottesford	1752	34UE2	Burton Latimer
1010	17UF0	rural	1626	31UH0	rural	1753	34UE3	Desborough
1011	17UF1	Matlock	1627	31UH1	Donisthorpe	1754	34UE4	Rothwell
1012	17UF2	Ashbourne	1628	31UH2	Swadlincote(part of)	1755	34UF0	rural
1013	17UF3	Wirksworth	1629	31UH3	Coalville	1756	34UF1	Northampton(main)
1014	17UF5	Bakewell	1630	31UH4	Ashby-de-la-Zouch	1757	34UF2	Wootton/Hardingstone(main)
1015	17UF6	Darley Dales	1631	31UH5	Castle Donington	1758	34UG0	rural
1016	17UG0	rural	1632	31UH6	Ibstock	1759	34UG1	Wootton/Hardingstone(part of)
1017	17UG1	Long Eaton	1633	31UH7	Measham	1760	34UG2	Brackley
1018	17UG2	Ilkeston	1634	31UH8	Kegworth	1761	34UG3	Towcester
1019	17UG3	Breaston	1635	31UJ1	Wigston	1762	34UG4	Middleton Cheney
1020	17UG4	Borrowash	1636	31UJ2	Oadby	1763	34UH0	rural
1021	17UG6	Derby(part of)	1637	32UB0	rural	1764	34UH1	Wellingborough
1022	17UG7	West Hallam	1638	32UB1	Boston	1765	34UH3	Earls Barton
1023	17UH0	rural	1639	32UB2	Kirton (Boston)	1766	34UH4	Irchester
1024	17UH1	Glossop/Hollingworth(main)	1640	32UC0	rural	1767	34UH5	Finedon
1025	17UH2	Buxton	1641	32UC1	Skegness	1768	34UH6	Wollaston
1026	17UH3	New Mills(main)	1642	32UC10	Alford	1826	37UB0	rural
1027	17UH4	Chapel-en-Le-Frith	1643	32UC2	Ingoldmells	1827	37UB1	Hucknall
1028	17UH5	Whaley Bridge	1644	32UC3	Louth	1828	37UB2	Sutton in Ashfield
1029	17UJ0	rural	1645	32UC4	Mablethorpe/Sutton on Sea	1829	37UB3	Kirkby in Ashfield(main)
1030	17UJ1	Mosborough/Highlane(part of)	1646	32UC5	Horncastle	1830	37UB4	Jacksdale(main)
1031	17UJ10	Wingerworth	1647	32UC6	Coningsby	1831	37UB5	South Normanton/Pinxton(part of)
1032	17UJ11	Shirland	1648	32UC7	Woodhall Spa(main)	1832	37UB6	Selston/Underwood/Brimsley(main)
1033	17UJ13	Grassmoor	1649	32UC8	Holton le Clay	1833	37UC0	rural
1034	17UJ14	Pilsley/Lower Pilsley	1650	32UC9	Chapel St Leonards	1834	37UC1	Worksop
1035	17UJ2	Staveley(part of)	1651	32UD1	Lincoln(main)	1835	37UC2	East Retford
1036	17UJ4	Chesterfield(part of)	1652	32UD2	Birchwood	1836	37UC3	Carlton-in-Lindrick
1037	17UJ5	Dronfield	1653	32UE0	rural	1837	37UC5	Harworth/Bircotes
1038	17UJ6	Clay Cross/North Wingfield	1654	32UE1	Lincoln(part of)	1838	37UD0	rural
1039	17UJ7	Killamarsh	1655	32UE10	Metheringham	1839	37UD1	Beeston and Stapleford
1040	17UJ8	Eckington	1656	32UE11	Skellingthorpe	1840	37UD2	Eastwood
1041	17UK0	rural	1657	32UE2	Waddington	1841	37UD3	Kimberley
1042	17UK1	Derby(part of)	1658	32UE3	Sleaford	1842	37UD4	Nottingham(part of)
1043	17UK2	Swadlincote(main)	1659	32UE4	Heighington/Washingborough	1843	37UD6	Selston/Underwood/Brimsley(part of)
1044	17UK3	Stapenhill/Winshill(part of)	1660	32UE5	Ruskington	1844	37UE0	rural
1045	17UK4	Tutbury/Hatton(part of)	1661	32UE6	Bracebridge Heath	1845	37UE1	Carlton(main)
1046	17UK5	Melbourne	1662	32UE7	Woodhall Spa(part of)	1846	37UE2	Arnold
1047	17UK6	Hilton	1663	32UE8	Branston	1847	37UE3	Nottingham(part of)
1585	31UB0	rural	1664	32UE9	Heckington	1848	37UE4	Kirkby in Ashfield(part of)
1586	31UB1	Leicester(part of)	1665	32UF0	rural	1849	37UE5	Calverton
1587	31UB10	Stoney Stanton	1666	32UF1	Spalding	1850	37UE6	Ravenshead
1588	31UB2	Kirby Muxloe	1667	32UF2	Pinchbeck	1851	37UE7	Burton Joyce(main)
1589	31UB3	Blaby	1668	32UF3	Holbeach	1852	37UF0	rural

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
1853	37UF1	Mansfield(main)	392	00EF3	Thornaby	**North West**		
1854	37UF2	Mansfield Woodhouse	393	00EF4	Ingleby	58	00BL0	rural
1855	37UF3	Warsop	394	00EF6	Eaglescliffe	59	00BL1	Bolton(main)
1856	37UF4	Rainworth(part of)	395	00EH0	rural	60	00BL10	Blackrod
1857	37UG0	rural	396	00EH1	Darlington	61	00BL2	Farnworth
1858	37UG00	rural	1128	20UB0	rural	62	00BL3	Bromley Cross/Bradshaw
1859	37UG1	Mansfield(part of)	1129	20UB1	Chester-le-Street(main)	63	00BL4	Horwich
1860	37UG2	Newark-on-Trent	1130	20UB2	Houghton-Le-Spring(part of)	64	00BL5	Little Lever(main)
1861	37UG3	Boughton/Ollerton	1131	20UB3	Ouston	65	00BL6	Kearsley
1862	37UG4	Rainworth(main)	1132	20UB4	Pelton	66	00BL7	Atherton(part of)
1863	37UG5	Southwell	1133	20UB5	Sacriston	67	00BL8	Swinton and Pendlebury(part of)
1864	37UG6	Edwinstowe	1134	20UB6	Great Lumley	68	00BL9	Westhoughton
1865	37UG7	Blidworth	1135	20UD0	rural	69	00BM0	rural
1866	37UG8	Burton Joyce(part of)	1136	20UD1	Stanley	70	00BM1	Bury(main)
1867	37UG9	Bilsthorpe	1137	20UD10	Lanchester	71	00BM2	Radcliffe
1868	37UJ0	rural	1138	20UD2	Annfield Plain	72	00BM3	Prestwich
1869	37UJ00	rural	1139	20UD3	Consett	73	00BM4	Whitefield
1870	37UJ1	West Bridgford(main)	1140	20UD4	Leadgate	74	00BM5	Ramsbottom
1871	37UJ2	Ruddington	1141	20UD5	Castleside	75	00BM6	Tottington
1872	37UJ4	Bingham	1142	20UD6	Chopwell(part of)	76	00BM7	Middleton(part of)
1873	37UJ5	Cotgrave	1143	20UD7	Langley Park	77	00BM8	Little Lever(part of)
1874	37UJ6	Radcliffe on Trent	1144	20UD8	Esh Winning(part of)	78	00BM9	Manchester(part of)
1875	37UJ7	Keyworth	1145	20UD9	Burnopfield	79	00BN1	Manchester(main)
1876	37UJ8	East Leake	1146	20UE0	rural	80	00BN2	Stockport(part of)
North East			1147	20UE1	Durham	81	00BN3	Salford(part of)
233	00CH0	rural	1148	20UE2	Brandon nr Durham	82	00BN4	South Manchester
234	00CH1	Gateshead	1149	20UE3	Ushaw Moor	83	00BP0	rural
235	00CH2	Felling	1150	20UE4	Esh Winning(main)	84	00BP1	Oldham
236	00CH3	Whickham	1151	20UE5	Bowburn	85	00BP2	Chadderton
237	00CH4	Ryton	1152	20UE6	Coxhoe	86	00BP3	Royton
238	00CH5	Blaydon	1153	20UE7	Sherburn nr Durham	87	00BP4	Failsworth
239	00CH6	Chester-le-Street(part of)	1154	20UF0	rural	88	00BP5	Shaw
240	00CH7	Rowlands Gill	1155	20UF2	Peterlee	89	00BP6	Rochdale(part of)
241	00CH8	Chopwell(main)	1156	20UF3	Seaham	90	00BP7	Dobcross/Uppermill
242	00CH9	Sunniside	1157	20UF4	Easington	91	00BQ0	rural
243	00CJ0	rural	1158	20UF5	Murton	92	00BQ1	Rochdale(main)
244	00CJ1	Newcastle upon Tyne	1159	20UF6	Blackhall Colliery	93	00BQ2	Middleton(main)
245	00CJ2	Newburn	1160	20UF7	Wingate	94	00BQ3	Heywood
246	00CJ3	Gosforth	1161	20UF8	Shotton Colliery	95	00BQ4	Littleborough
247	00CJ4	Wide Open(part of)	1162	20UF9	Wheatley Hill	96	00BQ5	Milnrow
248	00CK0	rural	1163	20UG0	rural	97	00BQ6	Wardle
249	00CK1	Wallsend	1164	20UG00	rural	98	00BQ7	Bury(part of)
250	00CK2	North Shields	1165	20UG1	Newton Aycliffe	99	00BR0	rural
251	00CK3	Whitley Bay	1166	20UG2	Spennymoor	100	00BR1	Salford(main)
252	00CK4	Long Benton/Killingworth	1167	20UG3	Ferryhill	101	00BR2	Swinton and Pendlebury(main)
253	00CK5	Tynemouth	1168	20UG4	Shildon	102	00BR3	Eccles
254	00CK6	Shiremoor	1169	20UG5	Sedgefield	103	00BR4	Walkden
255	00CK7	Wide Open(main)	1170	20UG6	Chilton	104	00BR5	Irlam
256	00CK8	Dudley (Tyne & Wear)	1171	20UH0	rural	105	00BR6	Tyldesley(part of)
257	00CL0	rural	1172	20UH1	Barnard Castle	106	00BS0	rural
258	00CL1	South Shields	1173	20UJ0	rural	107	00BS1	Stockport(main)
259	00CL2	Jarrow	1174	20UJ1	Bishop Auckland	108	00BS2	Cheadle and Gatley
260	00CL3	Hebburn	1175	20UJ2	Crook	109	00BS3	Hazel Grove and Bramhall
261	00CL4	Boldon	1176	20UJ3	Willington nr Crook	110	00BS4	Bredbury and Romiley
262	00CL5	Cleadon	1177	20UJ4	Coundon	111	00BS5	Brinnington
263	00CL6	Whitburn	1769	35UB0	rural	112	00BS6	SouthManchester(part of)
264	00CM0	rural	1770	35UB1	Alnwick	113	00BS7	Marple
265	00CM1	Washington	1771	35UB2	Amble	114	00BS8	High Lane(main)
266	00CM2	Houghton-Le-Spring(main)	1772	35UC0	rural	115	00BT0	rural
267	00CM3	Hetton-le-Hole	1773	35UC1	Berwick-upon-Tweed	116	00BT1	Ashton-under-Lyne
268	00CM5	Sunderland	1774	35UD0	rural	117	00BT10	Glossop/Hollingworth(part of)
374	00EB0	rural	1775	35UD1	Blyth	118	00BT11	Mossley
375	00EB1	Hartlepool	1776	35UD2	Cramlington	119	00BT12	Buckton Vale
376	00EC0	rural	1777	35UD3	Seaton Delaval	120	00BT2	Hyde
377	00EC1	Middlesbrough(main)	1778	35UD4	Seaton Sluice	121	00BT3	Denton
378	00EE0	rural	1779	35UE0	rural	122	00BT4	Droylsden
379	00EE1	Redcar	1780	35UE1	Morpeth	123	00BT5	Stalybridge
380	00EE10	New Marske	1781	35UE2	Ponteland	124	00BT6	Dukinfield
381	00EE2	Eston and South Bank	1782	35UE3	Pegswood	125	00BT7	Audenshaw
382	00EE3	Middlesbrough(part of)	1783	35UF0	rural	126	00BT8	Longdendale
383	00EE4	Guisborough	1784	35UF1	Hexham	127	00BT9	Stockport(part of)
384	00EE5	Marske-by-the-Sea	1785	35UF2	Prudhoe	128	00BU0	rural
385	00EE6	Skelton	1786	35UF3	Haltwhistle	129	00BU1	Sale
386	00EE7	Saltburn-by-the-Sea	1787	35UG0	rural	130	00BU2	Stretford
387	00EE8	Brotton	1788	35UG1	Ashington (Wansbeck)	131	00BU3	Urmston
388	00EE9	Loftus	1789	35UG2	Bedlington	132	00BU4	Altrincham
389	00EF0	rural	1790	35UG3	Guide Post	133	00BU5	Hale
390	00EF1	Stockton-on-Tees	1791	35UG4	Newbiggin-by-the-Sea	134	00BU6	Partington
391	00EF2	Billingham				135	00BU7	Bowdon

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
136	00BU8	SouthManchester(part of)	902	13UE1	Ellesmere Port(main)	1539	30UH1	Morecambe
137	00BW0	rural	903	13UE2	Neston	1540	30UH2	Lancaster
138	00BW1	Leigh	904	13UG0	rural	1541	30UH3	Bolton-le-Sands
139	00BW10	Abram	905	13UG00	rural	1542	30UH4	Carnforth
140	00BW11	Ashton-in-Makerfield(main)	906	13UG1	Wilmslow	1543	30UH5	Lancaster University
141	00BW12	Golborne	907	13UG10	Wilmslow	1544	30UJ0	rural
142	00BW13	Appley Bridge(main)	908	13UG2	Poynton	1545	30UJ1	Nelson
143	00BW14	Shevington	909	13UG3	Macclesfield	1546	30UJ2	Colne
144	00BW15	Aspull	910	13UG4	Prestbury	1547	30UJ3	Brierfield
145	00BW2	Tyldesley(main)	911	13UG5	Knutsford	1548	30UJ4	Barrowford & Carr Hall
146	00BW3	Hindley	912	13UG6	New Mills(part of)	1549	30UJ6	Barnoldswick
147	00BW4	Atherton(main)	913	13UG7	Bollington	1550	30UJ7	Earby
148	00BW6	Wigan	914	13UG8	High Lane(part of)	1551	30UK0	rural
149	00BW7	Standish	915	13UG9	Disley	1552	30UK1	Preston(main)
150	00BW8	Ince-in-Makerfield	916	13UH0	rural	1553	30UK2	Longridge(part of)
151	00BW9	Orrell(main)	917	13UH00	rural	1554	30UL0	rural
152	00BX0	rural	918	13UH1	Helsby	1555	30UL1	Blackburn(part of)
153	00BX1	Huyton-with-Roby	919	13UH2	Runcorn(part of)	1556	30UL2	Clitheroe
154	00BX2	Liverpool(part of)	920	13UH3	Northwich	1557	30UL3	Longridge(main)
155	00BX3	Prescot(main)	921	13UH4	Winsford	1558	30UL4	Whalley
156	00BX4	Widnes(part of)	922	13UH5	Frodsham	1559	30UM0	rural
157	00BX5	Kirkby(main)	923	13UH6	Weaverham	1560	30UM1	Whitworth
158	00BY1	Liverpool(main)	924	13UH7	Moulton (Vale royal)	1561	30UM2	Accrington(part of)
159	00BZ0	rural	925	13UH8	Sandiway	1562	30UM3	Rawtenstall
160	00BZ1	St Helens	958	16UB0	rural	1563	30UM4	Haslingden
161	00BZ2	Haydock	959	16UB1	Workington	1564	30UM5	Bacup
162	00BZ3	Prescot(part of)	960	16UB2	Seaton nr Workington	1565	30UN0	rural
163	00BZ4	Ashton-in-Makerfield(part of)	961	16UB4	Maryport	1566	30UN1	Preston(part of)
164	00BZ5	Newton-le-Willows	962	16UB5	Cockermouth	1567	30UN2	Leyland(main)
165	00BZ6	Billinge	963	16UB6	Wigton	1568	30UN3	Longton
166	00BZ7	Rainford	964	16UB7	Keswick	1569	30UN4	Higher Walton(main)
167	00CA0	rural	965	16UC0	rural	1570	30UP0	rural
168	00CA1	Bootle	966	16UC1	Barrow-in-Furness	1571	30UP1	Skelmersdale
169	00CA2	Crosby	967	16UC2	Isle of Walney	1572	30UP2	Orrell(part of)
170	00CA3	Litherland	968	16UC3	Dalton-in-Furness	1573	30UP3	Southport(part of)
171	00CA4	Southport(main)	969	16UC4	Askam in Furness	1574	30UP4	Ormskirk
172	00CA5	Formby	970	16UD0	rural	1575	30UP5	Burscough Bridge
173	00CA6	Kirkby(part of)	971	16UD1	Carlisle	1576	30UP6	Tarleton
174	00CA7	Maghull/Lydiate	972	16UD2	Brampton nr Carlisle	1577	30UP7	Appley Bridge(part of)
175	00CB0	rural	973	16UE0	rural	1578	30UP8	Banks
176	00CB1	Birkenhead	974	16UE00	rural	1579	30UQ0	rural
177	00CB2	Wallasey	975	16UE1	Whitehaven	1580	30UQ1	Thornton/Cleveleys
178	00CB3	Bebington	976	16UE2	Cleator Moor	1581	30UQ2	Fleetwood
179	00CB4	Greasby/Moreton	977	16UE3	Millom	1582	30UQ3	Poulton-le-Fylde(main)
180	00CB5	Heswall	978	16UE4	Egremont	1583	30UQ4	Garstang
181	00CB6	Hoylake/West Kirby	979	16UF0	rural	1584	30UQ5	Preesall
397	00ET0	rural	980	16UF1	Penrith	**Scotland**		
398	00ET1	Runcorn(main)	981	16UG0	rural	2233	QA0	rural
399	00ET2	Widnes(main)	982	16UG1	Kendal	2234	QA1	Aberdeen
400	00EU0	rural	983	16UG2	Ulverston	2235	QA2	Cove Bay
401	00EU1	Warrington	984	16UG3	Windermere	2236	QA3	Dyce
402	00EU2	Great Sankey	985	16UG4	Grange-over-Sands	2237	QA4	Kingswells
403	00EU3	Stockton Heath/Thelwall	986	16UG5	Ambleside	2238	QA5	Peterculter & Milltimber
404	00EU4	Risley	1513	30UD0	rural	2239	QB0	rural
405	00EU5	Lymm	1514	30UD1	Burnley	2240	QB15	Ellon
406	00EU6	Culcheth	1515	30UD2	Padiham	2241	QB16	Fraserburgh
407	00EU7	Burtonwood	1516	30UE0	rural	2242	QB21	Huntly
408	00EX0	rural	1517	30UE1	Chorley	2243	QB24	Inverurie
409	00EX1	Blackburn(main)	1518	30UE2	Clayton & Whittle-le-Woods	2244	QB26	Kemnay
410	00EX2	Darwen	1519	30UE3	Euxton	2245	QB30	Macduff
411	00EY1	Blackpool	1520	30UE4	Leyland(part of)	2246	QB39	Peterhead
884	13UB0	rural	1521	30UE6	Adlington	2247	QB41	Portlethen
885	13UB1	Ellesmere Port(part of)	1522	30UE7	Coppull	2248	QB49	Stonehaven
886	13UB2	Chester	1523	30UE8	Higher Walton(part of)	2249	QB55	Turriff
887	13UC0	rural	1524	30UE9	Eccleston	2250	QB56	Westhill (Aberdeensh
888	13UC1	Kidsgrove(part of)	1525	30UF0	rural	2251	QB6	Banchory
889	13UC2	Congleton	1526	30UF1	Lytham St. Anne's	2252	QB7	Banff
890	13UC3	Sandbach	1527	30UF2	Poulton-le-Fylde (part of)	2253	QC0	rural
891	13UC4	Alsager(main)	1528	30UF3	Kirkham	2254	QC1	Arbroath
892	13UC5	Middlewich	1529	30UF5	Freckleton/Warton	2255	QC11	Kirriemuir
893	13UC6	Holmes Chapel	1530	30UG0	rural	2256	QC13	Montrose
894	13UD0	rural	1531	30UG1	Blackburn(part of)	2257	QC3	Brechin
895	13UD00	rural	1532	30UG2	Accrington(main)	2258	QC4	Carnoustie
896	13UD1	Crewe	1533	30UG3	Oswaldwistle	2259	QC5	Dundee(part of)
897	13UD2	Alsager(part of)	1534	30UG4	Great Harwood (Hyndburn)	2260	QC8	Forfar
898	13UD3	Nantwich	1535	30UG5	Clayton-le-moors	2261	QD0	rural
899	13UD4	Haslington	1536	30UG6	Church	2262	QD00	rural
900	13UD5	Shavington	1537	30UG7	Rishton	2263	QD12	Oban
901	13UE0	rural	1538	30UH0	rural	2264	QD17	Rothesay

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
2265	QD3	Campbeltown	2344	QQ11	Grangemouth	2423	QZ13	Coatbridge
2266	QD6	Dunoon	2345	QQ13	Hallglen (Falkirk)	2424	QZ15	Cumbernauld
2267	QD8	Helensburgh	2346	QQ14	Polmont	2425	QZ22	Holytown
2268	QE0	rural	2347	QQ17	Stenhousemuir	2426	QZ23	Kilsyth
2269	QE11	Hawick	2348	QQ4	Bo'ness	2427	QZ24	Moodiesburn
2270	QE13	Jedburgh	2349	QQ5	Bonnybridge	2428	QZ25	Motherwell
2271	QE14	Kelso	2350	QQ7	Carron	2429	QZ27	New Stevenston
2272	QE20	Peebles	2351	QQ8	Denny	2430	QZ28	Newarthill
2273	QE21	Selkirk	2352	QR0	rural	2431	QZ29	Newmains
2274	QE8	Eyemouth	2353	QR10	Cardenden	2432	QZ33	Shotts
2275	QE9	Galashiels	2354	QR14	Cowdenbeath	2433	QZ34	Stepps
2276	QF0	rural	2355	QR18	Cupar	2434	QZ35	Viewpark
2277	QF1	Alloa	2356	QR19	Dalgety Bay	2435	QZ36	Wishaw
2278	QF2	Alva	2357	QR2	Anstruther	2436	QZ5	Bellshill
2279	QF3	Clackmannan	2358	QR20	Dunfermline	2437	RA0	rural
2280	QF7	Tillicoultry	2359	QR26	Glenrothes	2438	RA1	Kirkwall
2281	QF8	Tullibody	2360	QR30	Inverkeithing	2439	RB0	rural
2282	QG0	rural	2361	QR31	Kelty	2440	RB14	Crieff
2283	QG1	Alexandria	2362	QR32	Kennoway	2441	RB21	Kinross
2284	QG2	Bonhill	2363	QR33	Kincardine	2442	RB27	New Scone
2285	QG3	Clydebank	2364	QR37	Kirkcaldy	2443	RB28	Perth
2286	QG4	Dumbarton	2365	QR4	Ballingry	2444	RB5	Auchterarder
2287	QG5	Duntocher and Hardga	2366	QR41	Leven	2445	RB8	Blairgowrie
2288	QG6	Faifley	2367	QR43	Lochgelly	2446	RC0	rural
2289	QG8	Old Kilpatrick	2368	QR47	Newport-on-Tay	2447	RC1	Bishopton
2290	QH0	rural	2369	QR49	Oakley	2448	RC10	Kilbarchan
2291	QH1	Annan	2370	QR51	Rosyth	2449	RC12	Linwood
2292	QH14	Kirkcudbright	2371	QR54	St Andrews	2450	RC14	Paisley
2293	QH16	Locharbriggs	2372	QR58	Tayport	2451	RC15	Renfrew
2294	QH18	Lockerbie	2373	QR7	Buckhaven	2452	RC2	Bridge of Weir
2295	QH20	Newton Stewart	2374	QR8	Burntisland	2453	RC3	Elderslie
2296	QH24	Stranraer	2375	QS0	rural	2454	RC4	Erskine
2297	QH3	Castle Douglas	2376	QS2	Glasgow	2455	RC6	Houston
2298	QH5	Dalbeattie	2377	QT0	rural	2456	RC9	Johnstone
2299	QH6	Dumfries	2378	QT1	Alness	2457	RD0	rural
2300	QJ0	rural	2379	QT14	Culloden	2458	RD2	Lerwick
2301	QJ1	Dundee(main)	2380	QT15	Dingwall	2459	RE0	rural
2302	QK0	rural	2381	QT20	Fort William	2460	RE11	Prestwick
2303	QK1	Auchinleck	2382	QT25	Invergordon	2461	RE14	Troon
2304	QK12	Galston	2383	QT26	Inverness	2462	RE2	Ayr
2305	QK13	Hurlford and Crooked	2384	QT33	Nairn	2463	RE6	Girvan
2306	QK14	Kilmarnock	2385	QT41	Tain	2464	RE8	Maybole
2307	QK17	Mauchline	2386	QT42	Thurso	2465	RF0	rural
2308	QK19	New Cumnock	2387	QT44	Westhill (Highland)	2466	RF00	rural
2309	QK20	Newmilns	2388	QT45	Wick	2467	RF13	East Kilbride
2310	QK23	Stewarton	2389	QU0	rural	2468	RF15	Glasgow
2311	QK5	Cumnock	2390	QU1	Gourock	2469	RF17	Hamilton
2312	QK8	Darvel	2391	QU2	Greenock	2470	RF19	Kirkmuirhill and Bla
2313	QK9	Drongan	2392	QU4	Kilmacolm	2471	RF20	Lanark
2314	QL0	rural	2393	QU5	Port Glasgow	2472	RF21	Larkhall
2315	QL1	Bearsden	2394	QW0	rural	2473	RF23	Lesmahagow
2316	QL2	Bishopbriggs	2395	QW2	Bonnyrigg	2474	RF27	Stonehouse
2317	QL4	Kirkintilloch	2396	QW3	Dalkeith	2475	RF28	Strathaven
2318	QL5	Lennoxtown	2397	QW5	Gorebridge	2476	RF29	Uddingston
2319	QL6	Lenzie	2398	QW6	Loanhead	2477	RF3	Blantyre
2320	QL7	Milngavie	2399	QW7	Mayfield	2478	RF4	Bothwell
2321	QL8	Milton of Campsie	2400	QW9	Penicuik	2479	RF5	Carluke
2322	QM0	rural	2401	QX0	rural	2480	RG0	rural
2323	QM11	Musselburgh	2402	QX10	Forres	2481	RG10	Dunblane
2324	QM12	North Berwick	2403	QX12	Keith	2482	RG17	Stirling
2325	QM15	Prestonpans	2404	QX15	Lossiemouth	2483	RG3	Bannockburn
2326	QM16	Tranent	2405	QX2	Buckie	2484	RG4	Bridge of Allan
2327	QM2	Cockenzie	2406	QX6	Elgin	2485	RH0	rural
2328	QM3	Dunbar	2407	QY0	rural	2486	RH11	Fauldhouse
2329	QM8	Haddington	2408	QY00	rural	2487	RH14	Linlithgow
2330	QN0	rural	2409	QY1	Ardrossan	2488	RH15	Livingston
2331	QN1	Barrhead	2410	QY10	Kilwinning	2489	RH2	Armadale
2332	QN3	Clarkston	2411	QY12	Largs	2490	RH23	Whitburn
2333	QN4	Eaglesham	2412	QY14	Saltcoats	2491	RH3	Bathgate
2334	QN5	Giffnock	2413	QY17	Stevenston	2492	RH4	Blackburn (West Lothian)
2335	QN6	Neilston	2414	QY18	West Kilbride	2493	RH7	Broxburn
2336	QN7	Newton Mearns	2415	QY2	Beith	2494	RH9	East Calder
2337	QP0	rural	2416	QY4	Dalry	2495	RJ0	rural
2338	QP1	Edinburgh	2417	QY5	Dreghorn	2496	RJ7	Stornoway
2339	QP2	Kirkliston	2418	QY8	Irvine	**South West**		
2340	QP3	Queensferry	2419	QY9	Kilbirnie	483	00HA0	rural
2341	QP4	Currie	2420	QZ0	rural	484	00HA1	Bristol(part of)
2342	QQ0	rural	2421	QZ1	Airdrie	485	00HA2	Bath
2343	QQ10	Falkirk	2422	QZ10	Chapelhall	486	00HA3	Norton-Radstock

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
487	00HA4	Keynsham	1054	18UB6	Budleigh Salterton	1277	23UC3	Moreton-in-Marsh
488	00HA5	Peasedown St John	1055	18UB7	Lyme Regis(part of)	1278	23UC4	Bourton-on-the-Water
489	00HA6	Paulton	1056	18UB8	Ottery St.Mary	1279	23UD0	rural
490	00HA7	Saltford	1057	18UC0	rural	1280	23UD1	Tutshill/Sedbury
491	00HB1	Bristol(main)	1058	18UC1	Exeter	1281	23UD2	Coleford
492	00HB2	Avonmouth	1059	18UC2	Topsham	1282	23UD3	Cinderford
493	00HC0	rural	1060	18UD0	rural	1283	23UD4	Lydney
494	00HC1	Easton-in-Gordano	1061	18UD1	Tiverton	1284	23UD5	Newent
495	00HC10	Winscombe	1062	18UD2	Crediton	1285	23UE0	rural
496	00HC11	Long Ashton	1063	18UD3	Cullompton	1286	23UE1	Gloucester(main)
497	00HC12	Congresbury	1064	18UE0	rural	1287	23UF0	rural
498	00HC2	Weston-super-Mare	1065	18UE1	Barnstaple	1288	23UF1	Gloucester(part of)
499	00HC5	Clevedon	1066	18UE2	Ilfracombe	1289	23UF2	Stroud
500	00HC6	Nailsea	1067	18UE3	Braunton	1290	23UF3	Stonehouse
501	00HC7	Backwell	1068	18UE4	South Molton	1291	23UF6	Nailsworth
502	00HC8	Portishead	1069	18UE5	Fremington	1292	23UF7	Dursley
503	00HC9	Yatton	1070	18UG0	rural	1293	23UF8	Chalford
504	00HD0	rural	1071	18UG00	rural	1294	23UF9	Wotton-under-Edge
505	00HD00	rural	1072	18UG1	Plymouth(part of)	1295	23UG0	rural
506	00HD1	Kingswood	1073	18UG2	Ivybridge	1296	23UG1	Innsworth/Churchdown
507	00HD2	Bristol(part of)	1074	18UG3	Totnes	1297	23UG2	Gloucester(part of)
508	00HD3	Mangotsfield	1075	18UG4	Kingsbridge	1298	23UG3	Cheltenham(part of)
509	00HD4	Frampton Cotterell/Winterbourne	1076	18UG5	Dartmouth	1299	23UG4	Tewkesbury
510	00HD5	Stoke Gifford	1077	18UH0	rural	1300	23UG5	Ashchurch
511	00HD7	Chipping Sodbury	1078	18UH1	Newton Abbot	1301	23UG6	Bishop's Cleeve
512	00HD9	Thornbury	1079	18UH10	Ashburton	1302	23UG7	Winchcombe
513	00HG1	Plymouth(main)	1080	18UH11	Exminster	1931	40UB0	rural
514	00HH0	rural	1081	18UH2	Teignmouth	1932	40UB00	rural
515	00HH1	Torquay	1082	18UH3	Dawlish	1933	40UB1	Frome
516	00HH2	Paignton	1083	18UH5	Kingsteignton	1934	40UB2	Street
517	00HH3	Brixham	1084	18UH6	Kingskerswell	1935	40UB3	Wells
518	00HN0	rural	1085	18UH7	Bovey Tracey	1936	40UB4	Shepton Mallet
519	00HN1	Bournemouth(main)	1086	18UH8	Buckfastleigh	1937	40UB5	Glastonbury
520	00HP0	rural	1087	18UH9	Chudleigh	1938	40UC0	rural
521	00HP1	Poole(main)	1088	18UK0	rural	1939	40UC00	rural
522	00HP2	Bournemouth(part of)	1089	18UK00	rural	1940	40UC1	Bridgwater
523	00HP3	Oakley	1090	18UK1	Bideford	1941	40UC2	Burnham-on-Sea/Highbridge
524	00HX0	rural	1091	18UK2	Northam	1942	40UC3	Cheddar
525	00HX1	Swindon(main)	1092	18UK3	Great Torrington	1943	40UC4	North Petherton
526	00HX2	Highworth	1093	18UL0	rural	1944	40UD0	rural
527	00HX3	Wroughton	1094	18UL00	rural	1945	40UD1	Yeovil
926	15UB0	rural	1095	18UL1	Tavistock	1946	40UD2	Chard
927	15UB1	Saltash	1096	18UL2	Okehampton	1947	40UD3	Crewkerne
928	15UB2	Torpoint	1097	18UL3	Horrabridge/Yelverton	1948	40UD4	Wincanton
929	15UB3	Liskeard	1098	19UC0	rural	1949	40UD5	Ilminster
930	15UB4	Looe	1099	19UC1	Christchurch	1950	40UD6	Martock
931	15UB5	Callington	1100	19UC2	Burton	1951	40UD7	Somerton
932	15UC0	rural	1101	19UD0	rural	1952	40UD8	Castle Cary
933	15UC1	Falmouth(main)	1102	19UD1	Poole(part of)	1953	40UE0	rural
934	15UC2	Penryn(main)	1103	19UD2	Ferndown	1954	40UE1	Taunton
935	15UC3	Truro	1104	19UD4	Wimborne Minster	1955	40UE2	Wellington nr Taunton
936	15UC4	Perranporth	1105	19UD5	Verwood	1956	40UF0	rural
937	15UD0	rural	1106	19UD6	St Leonards	1957	40UF1	Minehead
938	15UD1	Camborne/Redruth	1107	19UE0	rural	1958	40UF2	Watchet
939	15UD2	Penryn(part of)	1108	19UE1	Blandford Forum	2182	46UB0	rural
940	15UD3	Falmouth(part of)	1109	19UE2	Gillingham nr Shaftsbury	2183	46UB1	Devizes
941	15UD4	Helston	1110	19UE3	Shaftesbury	2184	46UB2	Marlborough
942	15UD5	Porthleven	1111	19UG0	rural	2185	46UB3	Tidworth
943	15UE0	rural	1112	19UG1	Poole(part of)	2186	46UB4	Ludgershall
944	15UE1	Bodmin	1113	19UG2	Swanage	2187	46UB5	Pewsey
945	15UE2	Launceston	1114	19UG4	Wareham	2188	46UC0	rural
946	15UE3	Wadebridge	1115	19UG6	Lytchett Matravers	2189	46UC1	Swindon(part of)
947	15UE4	Bude/Stratton	1116	19UH0	rural	2190	46UC2	Chippenham
948	15UF0	rural	1117	19UH00	rural	2191	46UC3	Calne
949	15UF1	Penzance	1118	19UH2	Weymouth(part of)	2192	46UC4	Corsham
950	15UF2	St Ives (Cornwall)	1119	19UH3	Dorchester	2193	46UC5	Wootton Bassett
951	15UF3	Hayle	1120	19UH4	Bridport	2194	46UC6	Lyneham
952	15UG0	rural	1121	19UH5	Sherborne	2195	46UC7	Malmesbury
953	15UG1	St Austell	1122	19UH6	Lyme Regis(main)	2196	46UC8	Cricklade
954	15UG2	Newquay	1123	19UJ0	rural	2197	46UC9	Purton
955	15UG3	St Blazey/Par	1124	19UJ1	Weymouth(main)	2198	46UD0	rural
956	15UG4	St Columb Major	1125	19UJ2	Overcombe/Preston	2199	46UD1	Salisbury
957	15UH0	rural	1126	19UJ3	Easton/Weston	2200	46UD2	Durrington/Bulford
1048	18UB0	rural	1127	19UJ4	Fortuneswell	2201	46UD3	Amesbury
1049	18UB1	Exmouth	1272	23UB1	Cheltenham(main)	2202	46UD4	Wilton
1050	18UB2	Sidmouth	1273	23UB2	Charlton Kings	2203	46UF0	rural
1051	18UB3	Honiton	1274	23UC0	rural	2204	46UF1	Trowbridge
1052	18UB4	Seaton (Devon)	1275	23UC1	Cirencester	2205	46UF2	Melksham
1053	18UB5	Axminster	1276	23UC2	Tetbury	2206	46UF3	Bower Hill

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
2207	46UF5	Warminster	678	00NU1	Llanelli	757	00PL0	rural
2208	46UF6	Westbury	679	00NU2	Carmarthen	758	00PL1	Abercarn/Newbridge(part of)
2209	46UF7	Bradford-on-Avon	680	00NU3	Ammanford	759	00PL2	Ebbw Vale
Wales			681	00NU4	Pontardulais(part of)	760	00PL3	Brynmawr
603	00NA0	rural	682	00NU5	Burry Port	761	00PL4	Tredegar
604	00NA1	Holyhead	683	00NU6	Brynamman/Gwaun-Cae-Gurwen(part of)	762	00PL5	Abertillery
605	00NA2	Menai Bridge/Llandegfan	684	00NU7	Cross Hands	763	00PL6	Llanhilleth
606	00NA3	Llangefni	685	00NU8	Glanaman	764	00PM0	rural
607	00NA4	Llanfairpwllgwyngyll	686	00NU9	Tumble	765	00PM1	Cwmbran
608	00NC0	rural	687	00NX0	rural	766	00PM2	Pontypool
609	00NC00	rural	688	00NX1	Swansea(main)	767	00PM3	Caerleon(part of)
610	00NC1	Bangor	689	00NX2	Pontardawe/Clydach(part of)	768	00PM4	Blaenavon
611	00NC2	Caernarfon/Caeathro	690	00NX3	Gorseinon	769	00PP0	rural
612	00NC3	Bethesda/Rachub	691	00NX4	Pontardulais(main)	770	00PP1	Chepstow
613	00NC4	Blaenau Ffestiniog	692	00NX5	Bishopston	771	00PP2	Abergavenny
614	00NC5	Pwllheli	693	00NZ0	rural	772	00PP3	Caldicot
615	00NC6	Tywyn	694	00NZ00	rural	773	00PP4	Monmouth
616	00NC7	Porthmadog	695	00NZ1	Neath	774	00PP5	Magor
617	00NE0	rural	696	00NZ2	Port Talbot	775	00PR0	rural
618	00NE00	rural	697	00NZ3	Pontardawe/Clydach(main)	776	00PR1	Newport (Gwent)
619	00NE1	Abergele	698	00NZ4	Swansea(part of)	777	00PR4	Caerleon(main)
620	00NE2	Colwyn Bay	699	00NZ5	Ystradgynlais/Ystalyfera(part of)	778	00PT0	rural
621	00NE3	Llandudno	700	00NZ6	Brynamman/Gwaun-Cae-Gurwen(main)	779	00PT1	Cardiff(main)
622	00NE4	Deganwy/Llandudno Junction	701	00NZ7	Cwmavon/Pontrhydyfen	780	00PT2	Radyr
623	00NE5	Penrhyn Bay	702	00NZ8	Glyn-Neath	781	00PT3	Taff's Well(part of)
624	00NE6	Conwy	703	00PB0	rural	**West Midlands**		
625	00NE7	Llanfairfechan	704	00PB1	Bridgend	269	00CN0	rural
626	00NE8	Llanrwst	705	00PB2	Maesteg	270	00CN1	Birmingham(main)
627	00NG0	rural	706	00PB3	Porthcawl	271	00CN2	Sutton Coldfield(main)
628	00NG1	Rhyl	707	00PB4	Pyle	272	00CQ0	rural
629	00NG3	Prestatyn	708	00PB5	Aberkenfig/Bryncoch	273	00CQ1	Coventry(main)
630	00NG4	Denbigh	709	00PB6	Pencoed	274	00CR1	Dudley (West Midlands)
631	00NG5	Ruthin	710	00PB7	Pontycymer	275	00CR2	Halesowen
632	00NG6	Rhuddlan	711	00PD0	rural	276	00CR3	Stourbridge(main)
633	00NG7	Saint Asaph	712	00PD1	Penarth	277	00CS1	Oldbury/Smethwick
634	00NJ0	rural	713	00PD2	Dinas Powys	278	00CS2	West Bromwich
635	00NJ1	Broughton	714	00PD3	Cardiff(part of)	279	00CS3	Yew Tree
636	00NJ12	Mold	715	00PD4	Barry	280	00CT0	rural
637	00NJ13	Hope/Caergwrie(main)	716	00PD5	Llantwit Major	281	00CT1	Solihull
638	00NJ14	Penyffordd	717	00PD6	Rhoose	282	00CT2	Birmingham(part of)
639	00NJ2	Saltney(main)	718	00PD7	Cowbridge	283	00CT3	Knowle
640	00NJ3	Shotton/Hawarden	719	00PF0	rural	284	00CT4	Shelly Green
641	00NJ4	Connah's Quay	720	00PF1	Rhondda	285	00CT6	Balsall
642	00NJ5	Buckley	721	00PF10	Tonyrefail	286	00CU0	rural
643	00NJ6	Flint	722	00PF11	Beddau	287	00CU1	Walsall(main)
644	00NJ8	Holywell	723	00PF12	Ferndale	288	00CU2	Brownhills
645	00NL0	rural	724	00PF13	Llanharan	289	00CU3	Aldridge
646	00NL1	Wrexham	725	00PF14	Penrhys	290	00CU4	Sutton Coldfield(part of)
647	00NL10	Hope/Caergwrie(part of)	726	00PF15	Glyncoch	291	00CU5	Pelsall
648	00NL11	Chirk	727	00PF16	Ynysybwl	292	00CU6	Birmingham(part of)
649	00NL3	Wrexham(part of)	728	00PF17	Taff's Well(main)	293	00CU7	Shelfield
650	00NL4	Rhosllanerchrugog	729	00PF2	Pontypridd	294	00CU8	Rushall
651	00NL5	Cefn-mawr	730	00PF3	Church Village	295	00CW1	Wolverhampton(main)
652	00NL6	Ruabon	731	00PF4	Llantwit Ferdre	466	00GA0	rural
653	00NL7	Coedpoeth	732	00PF6	Aberdare	467	00GA1	Hereford
654	00NL8	Gresford	733	00PF7	Cwmbach	468	00GA2	Great Malvern(part of)
655	00NL9	Llay	734	00PF8	Mountain Ash/Abercynon	469	00GA3	Leominster
656	00NN0	rural	735	00PF9	Llantrisant/Pontyclun	470	00GA4	Ross-on-Wye
657	00NN0a	rural	736	00PH0	rural	471	00GA5	Ledbury
658	00NN0b	rural	737	00PH1	Merthyr Tydfil	472	00GA6	Bromyard
659	00NN0c	rural	738	00PH2	Abercanaid/Troedyrhiw	473	00GF0	rural
660	00NN1	Newtown	739	00PH3	Treharris/Nelson(main)	474	00GF1	Telford
661	00NN2	Ystradgynlais/Ystalyfera(main)	740	00PH4	Merthyr Vale	475	00GF10	Newport nr Telford
662	00NN3	Brecon	741	00PH5	Cyfarthfac	476	00GF2	Oakengates/Donnington
663	00NN4	Welshpool	742	00PK0	rural	477	00GF4	Ironbridge & Madeley
664	00NN5	Llandrindod Wells	743	00PK00	rural	478	00GF5	Hadley
665	00NQ0	rural	744	00PK1	Risca	479	00GF8	Wellington (Telford)
666	00NQ1	Aberystwyth	745	00PK10	Rhymney	480	00GL0	rural
667	00NQ2	Cardigan	746	00PK11	Abertridwr/Senghenydd	481	00GL1	Stoke-on-Trent(main)
668	00NS0	rural	747	00PK12	New Tredegar	482	00GL2	Kidsgrove(part of)
669	00NS1	Haverfordwest	748	00PK13	Llanbradach	1910	39UB0	rural
670	00NS2	Milford Haven	749	00PK2	Gelligaer	1911	39UB1	Broseley
671	00NS3	Pembroke Dock	750	00PK3	Blackwood	1912	39UB2	Bridgnorth
672	00NS4	Pembroke	751	00PK4	Bargoed	1913	39UB3	Albrighton
673	00NS5	Tenby	752	00PK5	Oakdale/Pontllanfraith	1914	39UB4	Shifnal
674	00NS6	Neyland	753	00PK6	Abercarn/Newbridge(main)	1915	39UB5	Highley
675	00NS7	Fishguard	754	00PK7	Caerphilly	1916	39UC0	rural
676	00NU0	rural	755	00PK8	Bedwas	1917	39UC1	Market Drayton
677	00NU00	rural	756	00PK9	Treharris/Nelson(part of)	1918	39UC2	Whitchurch

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
1919	39UC3	Wem	2128	44UE1	Redditch(part of)	43	00BA1	Merton
1920	39UC4	Ellesmere	2129	44UE2	Stratford-upon-Avon	44	00BB1	Newham
1921	39UD0	rural	2130	44UE3	Alcester	45	00BC1	Redbridge(main)
1922	39UD1	Oswestry	2131	44UE4	Southam	46	00BD1	Richmond upon Thames
1923	39UD2	Gobowen	2132	44UE5	Studley	47	00BE1	Southwark(main)
1924	39UE0	rural	2133	44UE6	Wellesbourne	48	00BE2	Southwark(part of)
1925	39UE1	Shrewsbury	2134	44UE7	Shipston on Stour	49	00BF0	rural
1926	39UE2	Bayston Hill	2135	44UE8	Bidford-on-Avon	50	00BF1	Sutton(main)
1927	39UF0	rural	2136	44UF0	rural	51	00BF2	Croydon(part of)
1928	39UF1	Ludlow	2137	44UF1	Coventry(part of)	52	00BF3	Banstead/Tadworth(part of)
1929	39UF2	Church Stretton	2138	44UF2	Leamington Spa	53	00BG1	Tower Hamlets
1930	39UF3	Tenbury Wells(part of)	2139	44UF3	Warwick	54	00BH1	Waltham Forest
1959	41UB0	rural	2140	44UF4	Kenilworth	55	00BJ1	Wandsworth
1960	41UB1	Cannock(main)	2210	47UB0	rural	56	00BK1	Westminster(part of)
1961	41UB2	Rugeley	2211	47UB1	Birmingham(part of)	57	00BK2	Westminster(main)
1962	41UB3	Norton Canes	2212	47UB2	Hagley	528	00JA0	rural
1963	41UC0	rural	2213	47UB3	Bromsgrove	529	00JA1	Peterborough(main)
1964	41UC00	rural	2214	47UB4	Catshill	530	00JA2	Market Deeping(part of)
1965	41UC1	Burton Upon Trent	2215	47UB5	Barnt Green	531	00KA1	Luton(main)
1966	41UC2	Stapenhill/Winshill(main)	2216	47UB6	Alvechurch	532	00KF1	Southend-on-Sea
1967	41UC3	Uttoxeter	2217	47UC0	rural	533	00KG0	rural
1968	41UC4	Tutbury/Hatton(main)	2218	47UC1	Worcester(part of)	534	00KG1	Grays
1969	41UC5	Barton-under-Needwood	2219	47UC2	Great Malvern(main)	535	00KG2	Tilbury
1970	41UD0	rural	2220	47UC3	Tenbury Wells(main)	536	00KG3	Stanford Le Hope/ Corringham
1971	41UD1	Sutton Coldfield(part of)	2221	47UD0	rural	537	00KG4	South Ockendon
1972	41UD3	Fazeley(main)	2222	47UD1	Redditch(main)	538	00KG5	Aveley
1973	41UD4	Burntwood	2223	47UE1	Worcester(main)	539	00KG6	Linford
1974	41UD5	Lichfield	2224	47UF0	rural	540	00LC0	rural
1975	41UD6	Armitage	2225	47UF3	Summerfield nr Kidderminster	541	00LC1	Gillingham(main)
1976	41UE0	rural	2226	47UF4	Droitwich	542	00LC2	Chatham(main)
1977	41UE1	Newcastle-under-Lyme(main)	2227	47UF6	Evesham	543	00LC3	Strood(main)
1978	41UE2	Kidsgrove(main)	2228	47UF7	Pershore	544	00LC4	Rochester
1979	41UE3	Stoke-on-Trent(part of)	2229	47UG0	rural	545	00LC5	Hoo
1980	41UE4	Audley	2230	47UG1	Kidderminster	546	00MA0	rural
1981	41UE5	Madeley/Middle Madeley	2231	47UG2	Stourport-on-Severn	547	00MA1	Sunningdale/Ascot(part of)
1982	41UF0	rural	2232	47UG3	Bewdley	548	00MA2	Bracknell
1983	41UF00	rural	**Wider South East**			549	00MA3	Crowthorne(part of)
1984	41UF1	Wolverhampton(part of)	1	00AA1	City of London	550	00MA4	Sandhurst
1985	41UF10	Kinver	2	00AB1	Barking and Dagenham	551	00MB0	rural
1986	41UF11	Featherstone nr Wolverhampton	3	00AC0	rural	552	00MB1	Reading(part of)
1987	41UF2	Walsall(part of)	4	00AC1	Barnet	553	00MB2	Newbury
1988	41UF3	Stourbridge(part of)	5	00AC2	Borehamwood(part of)	554	00MB3	Thatcham
1989	41UF4	Great Wyrley	6	00AD0	rural	555	00MB5	Burghfield Common
1990	41UF5	Cannock(part of)	7	00AD1	Bexley	556	00MB6	Hungerford
1991	41UF6	Stafford(part of)	8	00AD3	Dartford(part of)	557	00MB7	Goring/Streatley(part of)
1992	41UF7	Wombourne	9	00AE1	Brent	558	00MB8	Pangbourne/Whitchurch(main)
1993	41UF8	Codsall	10	00AF0	rural	559	00MB9	Mortimer
1994	41UF9	Penkridge	11	00AF1	Bromley	560	00MC0	rural
1995	41UG0	rural	12	00AF3	Biggin Hill(main)	561	00MC1	Reading(main)
1996	41UG1	Stoke-on-Trent(part of)	13	00AG1	Camden(main)	562	00MD0	rural
1997	41UG2	Newcastle-under-Lyme(part of)	14	00AG2	Camden(part of)	563	00MD1	Slough(main)
1998	41UG3	Stafford(main)	15	00AH1	Croydon(main)	564	00MD2	Colnbrook
1999	41UG4	Stone (Staffordshire)	16	00AH2	New Addington	565	00ME0	rural
2000	41UG5	Gnosall	17	00AJ1	Ealing	566	00ME1	Sunningdale/Ascot(main)
2001	41UH0	rural	18	00AK0	rural	567	00ME2	Virginia Water(part of)
2002	41UH1	Stoke-on-Trent(part of)	19	00AK1	Enfield	568	00ME3	Cookham
2003	41UH2	Leek	20	00AL1	Greenwich	569	00ME4	Maidenhead(main)
2004	41UH3	Biddulph	21	00AM1	Hackney	570	00ME5	Windsor/Eton
2005	41UH4	Cheadle	22	00AN1	Hammersmith and Fulham	571	00ME6	Old Windsor
2006	41UK1	Tamworth	23	00AP1	Haringey	572	00ME8	Datchet
2007	41UK2	Fazeley(part of)	24	00AQ0	rural	573	00MF0	rural
2110	44UB0	rural	25	00AQ1	Harrow	574	00MF1	Reading(part of)
2111	44UB1	Coleshill	26	00AR0	rural	575	00MF2	Wokingham
2112	44UB2	Water Orton	27	00AR1	Havering(main)	576	00MF3	Crowthorne(main)
2113	44UB3	Hartshill(part of)	28	00AS0	rural	577	00MF5	Twyford
2114	44UB4	Atherstone(main)	29	00AS1	Hillingdon(main)	578	00MF6	Spencers Wood
2115	44UB5	Dordon/Polesworth	30	00AS2	Harefield	579	00MG0	rural
2116	44UB6	Kingsbury	31	00AS3	Hillingdon(main)	580	00MG1	Milton Keynes
2117	44UB7	Baddesley Ensor	32	00AT1	Hounslow	581	00MG10	Woburn Sands(main)
2118	44UC0	rural	33	00AT2	Hounslow	582	00MG2	Bletchley
2119	44UC1	Bedworth	34	00AU1	Islington(main)	583	00MG3	Wolverton/Stony Stratford
2120	44UC2	Exhall	35	00AU2	Islington(part of)	584	00MG4	Newport Pagnell
2121	44UC3	Nuneaton	36	00AW1	Kensington and Chelsea(main)	585	00MG9	Olney
2122	44UC4	Hartshill(main)	37	00AW2	Kensington and Chelsea(part of)	586	00ML0	rural
2123	44UC5	Bulkington	38	00AX0	rural	587	00ML1	Brighton
2124	44UD0	rural	39	00AX1	Kingston upon Thames	588	00ML2	Hove
2125	44UD1	Coventry(part of)	40	00AY1	Lambeth(main)	589	00ML3	Portslade
2126	44UD2	Rugby	41	00AY2	Lambeth(part of)	590	00ML4	Rottingdean/Saltdean(main)
2127	44UE0	rural	42	00AZ1	Lewisham	591	00MR1	Portsmouth(main)

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
592	00MR2	Waterlooville(part of)	850	12UC6	Sutton (East Cambridge)	1223	22UF1	Chelmsford
593	00MS1	Southampton(main)	851	12UD0	rural	1224	22UF2	Wickford(part of)
594	00MW0	rural	852	12UD1	Wisbech(main)	1225	22UF3	South Woodham Ferrers
595	00MW1	Newport (Isle of Wight)	853	12UD2	March	1226	22UF4	Danbury/Little Baddow
596	00MW2	Ryde	854	12UD3	Whittlesey	1227	22UF5	Writtle
597	00MW3	Sandown/Shanklin	855	12UD4	Chatteris	1228	22UF6	Boreham
598	00MW4	Cowes/Northwood	856	12UD5	Doddington/Wimblington	1229	22UG0	rural
599	00MW5	Freshwater/Totland	857	12UE0	rural	1230	22UG1	Colchester
600	00MW6	Ventnor	858	12UE1	Peterborough(part of)	1231	22UG2	Wivenhoe
601	00MW7	Wootton (IOW)	859	12UE10	Sawtry	1232	22UG4	Tiptree
602	00MW8	Bembridge	860	12UE11	Brampton (Huntingdon)	1233	22UG5	West Mersea
782	09UC0	rural	861	12UE12	Warboys	1234	22UG6	Marks Tey
783	09UC1	Flitwick	862	12UE13	Somersham	1235	22UG7	West Bergholt
784	09UC10	Potton	863	12UE14	Little Paxton	1236	22UH0	rural
785	09UC11	Marston Moretaine	864	12UE3	St Neots	1237	22UH1	Loughton
786	09UC2	Ampthill	865	12UE4	Huntingdon	1238	22UH10	North Weald Bassett
787	09UC3	Biggleswade	866	12UE5	St Ives (Huntingdon)	1239	22UH11	Theydon Bois
788	09UC4	Henlow/Shefford	867	12UE6	Hemingford Grey	1240	22UH2	Waltham Abbey
789	09UC5	Sandy	868	12UE7	Ramsey	1241	22UH3	Chigwell
790	09UC6	Stotfold	869	12UE8	Yaxley	1242	22UH4	Hoddesdon(part of)
791	09UC7	Woburn Sands(part of)	870	12UE9	Godmanchester	1243	22UH5	Redbridge(part of)
792	09UC8	Cranfield	871	12UG0	rural	1244	22UH7	Sawbridgeworth(part of)
793	09UC9	Arlesey	872	12UG1	Cambridge(part of)	1245	22UH8	Epping
794	09UD0	rural	873	12UG10	Bar Hill	1246	22UH9	Chipping Ongar
795	09UD1	Bedford	874	12UG11	Waterbeach	1247	22UJ1	Harlow
796	09UD2	Kempston	875	12UG12	Willingham	1248	22UK0	rural
797	09UD3	Rushden(part of)	876	12UG2	Great Shelford	1249	22UK1	Maldon
798	09UD4	Bromham/Bridge End	877	12UG3	Girton	1250	22UK2	Burnham-on-Crouch
799	09UD5	Wootton nr Bedford	878	12UG4	Fulbourn	1251	22UK3	Southminster
800	09UD6	Clapham (Bedford)	879	12UG5	Histon	1252	22UK4	Maylandsea
801	09UE0	rural	880	12UG6	Sawston	1253	22UK5	Wickham Bishops/Great Totham
802	09UE1	Dunstable	881	12UG7	Cottenham	1254	22UL0	rural
803	09UE2	Luton(part of)	882	12UG8	Melbourn	1255	22UL1	Rayleigh
804	09UE3	Leighton Buzzard	883	12UG9	Linton	1256	22UL2	Rochford
805	09UE4	Barton in the Clay	1178	21UC1	Eastbourne(main)	1257	22UL3	Hockley
806	09UE5	Toddington	1179	21UD1	Hastings(main)	1258	22UL4	Hullbridge
807	09UE6	Eaton Bray(main)	1180	21UF0	rural	1259	22UL5	Great and Little Wakering
808	09UE7	Caddington	1181	21UF1	Rottingdean/Saltdean(part of)	1260	22UN1	Clacton-on-Sea
809	11UB0	rural	1182	21UF2	Burgess Hill(part of)	1261	22UN2	rural
810	11UB00	rural	1183	21UF3	Seaford	1262	22UN3	Harwich
811	11UB1	Aylesbury	1184	21UF4	Peacehaven	1263	22UN4	Frinton and Walton
812	11UB2	Buckingham	1185	21UF5	Lewes	1264	22UN5	Brightlingsea
813	11UB3	Wendover	1186	21UF6	Newhaven	1265	22UN6	Manningtree
814	11UB4	Haddenham nr Thame	1187	21UG0	rural	1266	22UN7	Jaywick
815	11UB5	Winslow	1188	21UG1	Bexhill	1267	22UQ0	rural
816	11UB6	Eaton Bray(part of)	1189	21UG3	Hastings(part of)	1268	22UQ00	rural
817	11UB7	Aston Clinton	1190	21UG4	Battle	1269	22UQ1	Saffron Walden
818	11UC0	rural	1191	21UG5	Rye	1270	22UQ2	Great Dunmow
819	11UC1	Hazlemere/Tylers Green(part of)	1192	21UH0	rural	1271	22UQ3	Stansted Mountfitchet
820	11UC3	Amersham	1193	21UH1	Eastbourne(part of)	1303	24UB0	rural
821	11UC4	Chesham	1194	21UH2	Crowborough	1304	24UB1	Basingstoke
822	11UC5	Chalfont St.Peter/Gerrards(main)	1195	21UH3	Hailsham	1305	24UB2	Basing
823	11UC6	Beaconsfield(part of)	1196	21UH4	Uckfield	1306	24UB3	Tadley
824	11UC7	Great Missenden/Prestwood	1197	21UH5	Heathfield	1307	24UB4	Hook (Hampshire)(part of)
825	11UC8	Chalfont St.Giles	1198	21UH6	Wadhurst	1308	24UB5	Oakley nr Basingstoke
826	11UE0	rural	1199	21UH7	Forest Row	1309	24UB6	Whitchurch (Hampshire)
827	11UE1	Hillingdon(part of)	1200	22UB1	Basildon	1310	24UB7	Bramley
828	11UE2	Slough(part of)	1201	22UB2	rural	1311	24UB8	Overton nr Basingstoke
829	11UE3	Farnham Royal	1202	22UB3	Billericay(main)	1312	24UB9	Kingsclere
830	11UE4	Stoke Poges	1203	22UB5	Wickford(main)	1313	24UC0	rural
831	11UE5	Maidenhead(part of)	1204	22UC0	rural	1314	24UC00	rural
832	11UE6	Chalfont St.Peter/Gerrards(part of)	1205	22UC1	Braintree	1315	24UC1	Waterlooville(part of)
833	11UE7	Beaconsfield(main)	1206	22UC2	Witham	1316	24UC10	Headley
834	11UE8	Iver/Iver Heath	1207	22UC3	Halstead nr Colne	1317	24UC11	Four Marks/Medstead
835	11UF0	rural	1208	22UC4	Kelvedon	1318	24UC2	Havant(part of)
836	11UF1	High Wycombe	1209	22UC5	Coggeshall	1319	24UC3	Farnham(part of)
837	11UF2	Hazlemere/Tylers Green(main)	1210	22UC6	Silver End	1320	24UC4	Bordon
838	11UF3	Bourne End/Flackwell Heath	1211	22UC7	Earls Colne	1321	24UC5	Alton
839	11UF5	Marlow	1212	22UC8	Hatfield Peverel	1322	24UC6	Petersfield
840	11UF6	Princes Risborough	1213	22UC9	Sible Hedingham	1323	24UC7	Liss(main)
841	11UF7	Stokenchurch	1214	22UD0	rural	1324	24UC8	Hindhead(part of)
842	11UF8	Walter's Ash/Naphill	1215	22UD1	Brentwood	1325	24UC9	Liphook
843	12UB1	Cambridge(main)	1216	22UD2	Billericay(part of)	1326	24UD0	rural
844	12UC0	rural	1217	22UD3	Doddinghurst/Wyatts Green	1327	24UD1	Eastleigh(main)
845	12UC1	Newmarket(part of)	1218	22UD4	Ingatestone	1328	24UD2	Bishopstoke
846	12UC2	Ely	1219	22UE0	rural	1329	24UD3	Southampton(part of)
847	12UC3	Soham	1220	22UE1	Benfleet	1330	24UD4	Bursledon
848	12UC4	Littleport	1221	22UE2	Canvey Island	1331	24UD5	Hedge End
849	12UC5	Burwell	1222	22UF0	rural	1332	24UD7	Netley

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
1333	24UD8	Hamble	1412	26UF4	Baldock	1491	29UM2	Sittingbourne
1334	24UE0	rural	1413	26UF5	Hitchin	1492	29UM4	Minster
1335	24UE1	Fareham/Portchester	1414	26UF6	Royston(Herts)	1493	29UM5	Queenborough
1336	24UE2	Stubbington	1415	26UF7	Knebworth	1494	29UM6	Faversham
1337	24UE3	Locks Heath	1416	26UG0	rural	1495	29UM7	Sheerness
1338	24UF1	Gosport	1417	26UG1	Watford(part of)	1496	29UN0	rural
1339	24UF2	Lee-on-the-Solent	1418	26UG2	St Albans	1497	29UN1	Margate
1340	24UG0	rural	1419	26UG3	Hatfield(part of)	1498	29UN2	Ramsgate
1341	24UG1	Yateley	1420	26UG4	Harpenden	1499	29UN3	Broadstairs
1342	24UG2	Frogmore	1421	26UG5	Redbourn	1500	29UP0	rural
1343	24UG3	Fleet	1422	26UG6	Wheathampstead	1501	29UP1	Chatham(part of)
1344	24UG4	Hook (Hampshire)(main)	1423	26UH0	rural	1502	29UP2	Tonbridge
1345	24UG5	Hartley Wintney	1424	26UH1	Stevenage(main)	1503	29UP3	Aylesford/East Malling
1346	24UH0	rural	1425	26UJ0	rural	1504	29UP4	Snodland
1347	24UH1	Waterlooville(main)	1426	26UJ1	Watford(part of)	1505	29UP5	Borough Green
1348	24UH2	Havant(main)	1427	26UJ2	South Oxhey	1506	29UP6	Kings Hill
1349	24UH3	Portsmouth(part of)	1428	26UJ3	Rickmansworth	1507	29UQ0	rural
1350	24UH4	Emsworth	1429	26UJ4	Chorleywood	1508	29UQ1	Royal Tunbridge Wells
1351	24UH5	Hayling Island	1430	26UJ5	Hillingdon(part of)	1509	29UQ2	Paddock Wood
1352	24UJ0	rural	1431	26UJ6	Kings Langley(part of)	1510	29UQ3	Pembury
1353	24UJ1	New Milton/Barton-on-Sea	1432	26UK1	Watford(main)	1511	29UQ4	Cranbrook
1354	24UJ10	Marchwood	1433	26UL0	rural	1512	29UQ5	Hawkhurst
1355	24UJ11	Milford on Sea	1434	26UL1	Hatfield(main)	1686	33UB0	rural
1356	24UJ12	Bransgore	1435	26UL2	Welwyn Garden City	1687	33UB1	Thetford
1357	24UJ3	Totton	1436	26UL3	Welwyn/Codicote(main)	1688	33UB2	East Dereham
1358	24UJ4	Ashhurst/Netley Marsh	1437	26UL4	Welwyn North	1689	33UB3	Attleborough
1359	24UJ5	Hythe nr Southampton	1438	26UL5	Potters Bar(part of)	1690	33UB4	Watton
1360	24UJ6	Lymington	1439	26UL6	Cuffley	1691	33UB6	Swaffham
1361	24UJ7	Fawley	1440	26UL7	Brookmans Park	1692	33UC0	rural
1362	24UJ8	Ringwood	1441	29UB0	rural	1693	33UC1	Norwich(part of)
1363	24UJ9	Fordingbridge/Sandleheath	1442	29UB1	Ashford	1694	33UC2	Taverham
1364	24UL1	Farnborough	1443	29UB2	Tenterden	1695	33UC4	Brundall
1365	24UL2	Aldershot(main)	1444	29UC0	rural	1696	33UC5	Aylsham
1366	24UN0	rural	1445	29UC1	Herne Bay	1697	33UC6	Spixworth
1367	24UN00	rural	1446	29UC2	Whitstable	1698	33UC7	Horsford
1368	24UN1	Eastleigh(part of)	1447	29UC3	Canterbury	1699	33UC8	Wroxham/Hoveton(part of)
1369	24UN2	Southampton(part of)	1448	29UC5	Sturry	1700	33UD0	rural
1370	24UN3	Andover	1449	29UD0	rural	1701	33UD1	Great Yarmouth
1371	24UN4	Romsey	1450	29UD1	Dartford(main)	1702	33UD2	Caister-on-Sea
1372	24UN5	North Baddesley	1451	29UD2	Swanscombe	1703	33UD3	Hemsby
1373	24UP0	rural	1452	29UD3	Longfield/New Ash Green(part of)	1704	33UD4	Belton nr Yarmouth
1374	24UP1	Eastleigh(part of)	1453	29UD4	Sutton-at-Hone/South Darenth(main)	1705	33UD5	Martham
1375	24UP2	Whiteley	1454	29UE0	rural	1706	33UE0	rural
1376	24UP3	Winchester	1455	29UE1	Dover	1707	33UE1	King's Lynn/West Lynn
1377	24UP4	Bishops Waltham	1456	29UE2	Whitfield	1708	33UE10	Terrington St. Clement
1378	24UP5	Denmead	1457	29UE3	Deal	1709	33UE3	Wisbech(part of)
1379	24UP6	Alresford	1458	29UE4	Sandwich	1710	33UE4	Heacham
1380	24UP7	Kings Worthy	1459	29UE5	Aylesham	1711	33UE5	Hunstanton
1381	24UP8	Colden Common	1460	29UG0	rural	1712	33UE6	Downham Market
1382	26UB0	rural	1461	29UG1	Gravesend	1713	33UE8	Dersingham
1383	26UB1	Cheshunt	1462	29UG2	Northfleet	1714	33UE9	Outwell
1384	26UB2	Hoddesdon(main)	1463	29UG3	Strood(part of)	1715	33UF0	rural
1385	26UC0	rural	1464	29UG4	Meopham	1716	33UF1	North Walsham
1386	26UC1	Hemel Hempstead	1465	29UG5	Culverstone Green	1717	33UF2	Cromer
1387	26UC2	Kings Langley(main)	1466	29UG6	Higham/Shorne	1718	33UF3	Fakenham
1388	26UC3	Berkhamsted	1467	29UG7	Istead Rise	1719	33UF4	Sheringham
1389	26UC4	Tring	1468	29UH0	rural	1720	33UF5	Stalham
1390	26UC5	Bovingdon	1469	29UH1	Chatham(part of)	1721	33UF6	Holt
1391	26UD0	rural	1470	29UH2	Maidstone	1722	33UF7	Wroxham/Hoveton(main)
1392	26UD1	Hoddesdon(part of)	1471	29UH3	Staplehurst	1723	33UG0	rural
1393	26UD10	Standon	1472	29UH4	Coxheath	1724	33UG1	Norwich(main)
1394	26UD2	Sawbridgeworth(main)	1473	29UK0	rural	1725	33UH0	rural
1395	26UD3	Stevenage(part of)	1474	29UK1	Bromley(part of)	1726	33UH1	Norwich(part of)
1396	26UD5	Hertford	1475	29UK2	Sevenoaks	1727	33UH10	Long Stratton
1397	26UD6	Ware	1476	29UK3	Swanley/Hextable	1728	33UH11	Loddon
1398	26UD7	Bishop's Stortford	1477	29UK4	Longfield/New Ash Green(main)	1729	33UH4	Wymondham
1399	26UD8	Buntingford	1478	29UK5	Edenbridge	1730	33UH5	Diss
1400	26UD9	St Margarets	1479	29UK6	Otford/Kemsing	1731	33UH7	Poringland
1401	26UE0	rural	1480	29UK7	Sutton-at-Hone/South Darenth(part of	1732	33UH8	Hethersett
1402	26UE1	Bushey	1481	29UK8	West Kingsdown	1733	33UH9	Harleston
1403	26UE2	Watford(part of)	1482	29UL0	rural	1877	38UB0	rural
1404	26UE3	Borehamwood(main)	1483	29UL1	Folkestone	1878	38UB1	Banbury
1405	26UE4	Potters Bar(main)	1484	29UL2	Hythe	1879	38UB2	Bicester
1406	26UE5	Radlett	1485	29UL3	Romney	1880	38UB3	Kidlington
1407	26UE6	Shenley	1486	29UL4	Dymchurch/St Mary's Bay	1881	38UB4	Bloxham
1408	26UF0	rural	1487	29UL5	Hawkinge	1882	38UC0	rural
1409	26UF1	Stevenage(part of)	1488	29UL6	Lydd	1883	38UC1	Oxford(main)
1410	26UF2	Welwyn/Codicote(part of)	1489	29UM0	rural	1884	38UD0	rural
1411	26UF3	Letchworth	1490	29UM1	Gillingham(part of)	1885	38UD1	Oxford(part of)

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
1886	38UD10	Goring/Streatley(main)	2063	43UF00	rural	2173	45UG1	Burgess Hill(main)
1887	38UD11	Pangbourne/Whitchurch(part of)	2064	43UF1	Banstead/Tadworth(main)	2174	45UG2	Haywards Heath
1888	38UD12	Cholsey	2065	43UF2	Croydon(part of)	2175	45UG3	East Grinstead(main)
1889	38UD2	Didcot(main)	2066	43UF3	Sutton(part of)	2176	45UG4	Hurstpierpoint/Keymer
1890	38UD3	Thame	2067	43UF4	Reigate/Redhill	2177	45UG5	Crawley Down
1891	38UD4	Henley-on-Thames	2068	43UF5	Horley	2178	45UG6	Copthorne
1892	38UD5	Wallingford	2069	43UF6	Salfords	2179	45UG7	Cuckfield
1893	38UD6	Benson	2070	43UG0	rural	2180	45UH1	Worthing
1894	38UD7	Wheatley/Horspath	2071	43UG1	Egham	2181	45UH2	Littlehampton(part of)
1895	38UD8	Chinnor	2072	43UG2	Addlestone	**Yorkshire and the Humber**		
1896	38UD9	Sonning Common	2073	43UG3	Chertsey	182	00CC0	rural
1897	38UE0	rural	2074	43UG4	Woking/Byfleet(part of)	183	00CC1	Barnsley
1898	38UE1	Oxford(part of)	2075	43UG5	Virginia Water(main)	184	00CC10	Dearne
1899	38UE2	Abingdon	2076	43UG6	Ottershaw	185	00CC11	Thurnscoe
1900	38UE3	Didcot(part of)	2077	43UH0	rural	186	00CC12	Penistone
1901	38UE4	Wantage/Grove	2078	43UH1	Staines	187	00CC13	Brierley
1902	38UE5	Faringdon	2079	43UH2	Sunbury	188	00CC2	Hoyland Nether
1903	38UE6	Shrivenham	2080	43UH3	Shepperton	189	00CC3	Wombwell
1904	38UE7	Kennington	2081	43UH4	Feltham	190	00CC4	Darton
1905	38UF0	rural	2082	43UH5	Walton and Weybridge(part of)	191	00CC5	Cudworth
1906	38UF1	Witney	2083	43UJ0	rural	192	00CC6	Worsbrough
1907	38UF3	Carterton	2084	43UJ1	West End	193	00CC7	Royston nr Barnsley
1908	38UF4	Chipping Norton	2085	43UJ2	Windlesham	194	00CC8	Darfield
1909	38UF5	Eynsham	2086	43UJ3	Woking/Byfleet(part of)	195	00CC9	Dodworth
2008	42UB0	rural	2087	43UJ4	Sunningdale/Ascot(part of)	196	00CE0	rural
2009	42UB1	Ipswich(part of)	2088	43UJ5	Camberley/Frimley	197	00CE1	Mexborough
2010	42UB2	Sudbury	2089	43UJ6	Aldershot(part of)	198	00CE10	Conisbrough
2011	42UB3	Hadleigh	2090	43UJ7	Lightwater	199	00CE11	New Rossington
2012	42UB4	Glemsford	2091	43UJ8	Bagshot	200	00CE12	Adwick le Street
2013	42UC0	rural	2092	43UK0	rural	201	00CE13	Carcroft
2014	42UC00	rural	2093	43UK00	rural	202	00CE14	Askern
2015	42UC1	Newmarket(main)	2094	43UK1	Caterham and Warlingham	203	00CE15	Tickhill
2016	42UC3	Mildenhall	2095	43UK3	East Grinstead(part of)	204	00CE16	Finningley
2017	42UC5	Lakenheath	2096	43UK4	Biggin Hill(part of)	205	00CE17	Bawtree/Austerfield
2018	42UC6	Brandon nr Thetford	2097	43UK5	Oxted	206	00CE2	Doncaster
2019	42UD0	rural	2098	43UK6	Smallfield	207	00CE3	Bentley
2020	42UD1	Ipswich(main)	2099	43UK7	Lingfield	208	00CE4	Kirk Sandall
2021	42UE0	rural	2100	43UL0	rural	209	00CE5	Armthorpe
2022	42UE1	Ipswich(part of)	2101	43UL1	Farnham(main)	210	00CE6	Hatfield nr Doncaster
2023	42UE2	Stowmarket	2102	43UL2	Godalming(main)	211	00CE7	Stainforth
2024	42UE3	Needham Market	2103	43UL3	Haslemere(main)	212	00CE8	Bessacarr
2025	42UE4	Claydon	2104	43UL4	Cranleigh	213	00CE9	Thorne/Moorends
2026	42UE5	Elmswell	2105	43UL6	Milford/Witley	214	00CF0	rural
2027	42UF0	rural	2106	43UL7	Hindhead(main)	215	00CF1	Rotherham
2028	42UF00	rural	2107	43UL8	Bramley and Wonersh	216	00CF10	Thurcroft
2029	42UF1	Bury St Edmunds	2108	43UM0	rural	217	00CF11	Thorpe Hesley
2030	42UF3	Haverhill	2109	43UM1	Woking/Byfleet(main)	218	00CF2	Rawmarsh
2031	42UG0	rural	2141	45UB0	rural	219	00CF3	Aughton
2032	42UG1	Ipswich(part of)	2142	45UB1	Sompting/Lancing	220	00CF4	Sheffield(part of)
2033	42UG2	Martlesham Heath	2143	45UB2	Shoreham	221	00CF5	Wath upon Dearne
2034	42UG3	Felixstowe	2144	45UB3	Southwick	222	00CF6	Swinton
2035	42UG4	Woodbridge	2145	45UC0	rural	223	00CF7	Anston/Dinnington/Laughton Common
2036	42UG5	Leiston	2146	45UC1	Littlehampton(main)	224	00CF8	Maltby
2037	42UH0	rural	2147	45UC3	Bognor Regis	225	00CF9	Wales
2038	42UH1	Lowestoft/Corton	2148	45UC4	Westergate/Barnham/Yapton	226	00CG0	rural
2039	42UH2	Beccles	2149	45UC5	Arundel	227	00CG1	Sheffield(main)
2040	42UH3	Halesworth	2150	45UD0	rural	228	00CG2	Chapeltown
2041	42UH4	Bungay	2151	45UD0a	rural	229	00CG3	Mosborough/Highlane(main)
2042	42UH5	Kessingland	2152	45UD0b	rural	230	00CG4	Beighton
2043	42UH6	Southwold	2153	45UD1	Chichester	231	00CG5	Stocksbridge
2044	43UB0	rural	2154	45UD2	Southbourne	232	00CG6	Oughtibridge & Wharncliffe Side
2045	43UB1	Walton and Weybridge(main)	2155	45UD3	Haslemere(part of)	296	00CX0	rural
2046	43UB2	Esher/Molesey	2156	45UD4	Selsey	297	00CX1	Bradford(main)
2047	43UB3	Cobham/Oxshott	2157	45UD5	Liss(part of)	298	00CX10	Steeton
2048	43UC0	rural	2158	45UD6	Midhurst	299	00CX11	Silsden
2049	43UC1	Epsom and Ewell	2159	45UD7	East Wittering	300	00CX12	Haworth
2050	43UD0	rural	2160	45UD8	Tangmere/Boxgrove	301	00CX13	Burley in Wharfedale
2051	43UD1	Leatherhead(part of)	2161	45UE1	Crawley(main)	302	00CX14	Wilsden
2052	43UD3	Woking/Byfleet(part of)	2162	45UF0	rural	303	00CX15	Addingham
2053	43UD4	Aldershot(part of)	2163	45UF1	Crawley(part of)	304	00CX2	Keighley
2054	43UD5	Guildford	2164	45UF2	Horsham	305	00CX3	Shipley
2055	43UD6	Godalming(part of)	2165	45UF3	Steyning/Upper Beeding	306	00CX4	Bingley
2056	43UD7	Send/West Clandon/Ripley	2166	45UF4	Southwater	307	00CX5	Baildon
2057	43UD8	East Horsley	2167	45UF5	Storrington	308	00CX6	Queensbury
2058	43UE0	rural	2168	45UF6	Billingshurst	309	00CX7	Menston
2059	43UE1	Leatherhead(main)	2169	45UF7	Henfield	310	00CX8	Brighouse(part of)
2060	43UE2	Crawley(part of)	2170	45UF8	Pulborough	311	00CX9	Ilkley
2061	43UE3	Dorking	2171	45UF9	West Chiltington Common	312	00CY0	rural
2062	43UF0	rural	2172	45UG0	rural	313	00CY1	Brighouse(main)

ZoneID	Zonecode	ZoneName	ZoneID	Zonecode	ZoneName
314	00CY10	Mytholmroyd	431	00FC1	Grimsby
315	00CY2	Shelf	432	00FC2	Cleethorpes
316	00CY3	Huddersfield(part of)	433	00FC3	Humberston
317	00CY4	Halifax	434	00FC4	Waltham
318	00CY5	Elland	435	00FC5	New Waltham
319	00CY6	Todmorden	436	00FC6	Immingham/Killingholme(main)
320	00CY7	Northowram	437	00FD0	rural
321	00CY8	Hebden Bridge	438	00FD1	Scunthorpe
322	00CY9	Ripponden	439	00FD2	Immingham/Killingholme(part of)
323	00CZ0	rural	440	00FD3	Barton-upon-Humber
324	00CZ1	Huddersfield(main)	441	00FD4	Brigg
325	00CZ10	Meltham	442	00FD5	Winterton
326	00CZ11	Shepley/Shelley	443	00FD6	Broughton nr Scunthorpe
327	00CZ12	Kirkburton	444	00FD7	Epworth
328	00CZ13	Marsden	445	00FD8	Messingham
329	00CZ2	Dewsbury	446	00FD9	Crowle
330	00CZ3	Batley	447	00FF0	rural
331	00CZ4	Cleckheaton and Liversedge	448	00FF1	York
332	00CZ5	Holmfirth/Honley	449	00FF2	Haxby
333	00CZ6	Mirfield	450	00FF3	Strensall
334	00CZ7	Heckmondwike	451	00FF4	Copmanthorpe
335	00CZ8	Bradford(part of)	452	00FF5	Poppleton
336	00CZ9	Skelmanthorpe/Clayton West	453	00FF6	Bishopthorpe
337	00DA0	rural	1792	36UB0	rural
338	00DA00	rural	1793	36UB1	Skipton
339	00DA1	Leeds	1794	36UB2	Glusburn
340	00DA10	Great Preston/Kippax	1795	36UB3	Settle
341	00DA11	Garforth	1796	36UC0	rural
342	00DA12	Otley(main)	1797	36UC1	Northallerton
343	00DA14	Wetherby & Collington	1798	36UC2	Thirsk
344	00DA15	Boston Spa	1799	36UC3	Stokesley
345	00DA16	Bramhope	1800	36UC4	Great Ayton
346	00DA17	Swillington	1801	36UC5	Bedale
347	00DA18	East Keswick/Bardsey	1802	36UC6	Easingwold
348	00DA2	Morley	1803	36UD0	rural
349	00DA3	Pudsey	1804	36UD1	Harrogate/Knaresborough
350	00DA4	Guiseley/Yeadon	1805	36UD2	Ripon/Sharow
351	00DA5	Horsforth	1806	36UD3	Otley(part of)
352	00DA6	Lofthouse/Stanley(part of)	1807	36UD4	Boroughbridge
353	00DA7	Bradford(part of)	1808	36UE0	rural
354	00DA9	Rothwell nr Leeds	1809	36UE1	Catterick Garrison
355	00DB0	rural	1810	36UE2	Richmond
356	00DB1	Wakefield	1811	36UF0	rural
357	00DB10	Featherstone (Yorkshire)	1812	36UF1	Norton & Malton
358	00DB12	Hemsworth	1813	36UF3	Pickering
359	00DB13	Normanton North	1814	36UG0	rural
360	00DB14	Upton	1815	36UG1	Scarborough
361	00DB15	Ackworth Moor Top	1816	36UG2	Eastfield
362	00DB16	Crofton	1817	36UG3	Scalby
363	00DB17	Ryhill	1818	36UG4	Whitby
364	00DB18	Fitzwilliam	1819	36UG5	Filey
365	00DB19	Walton	1820	36UG6	Hunmanby
366	00DB2	Ossett	1821	36UH0	rural
367	00DB3	Lofthouse/Stanley(main)	1822	36UH1	Selby
368	00DB4	Horbury	1823	36UH3	Tadcaster
369	00DB5	Castleford	1824	36UH4	Sherburn in Elmet
370	00DB6	Normanton South	1825	36UH5	Barlby
371	00DB7	Pontefract			
372	00DB8	South Kirkby/South Elmsall			
373	00DB9	Knottingley			
412	00FA1	Kingston upon Hull(main)			
413	00FB0	rural			
414	00FB00	rural			
415	00FB1	Kingston upon Hull(part of)			
416	00FB10	Pocklington			
417	00FB11	North Ferriby/Swanland			
418	00FB12	Withernsea			
419	00FB13	Market Weighton			
420	00FB14	Howden			
421	00FB15	Stamford Bridge			
422	00FB16	South Cave			
423	00FB2	Bridlington			
424	00FB3	Beverley			
425	00FB4	Goole			
426	00FB5	Great Driffield			
427	00FB6	Hedon			
428	00FB8	Brough/Elloughton/Welton			
429	00FB9	Hornsea			
430	00FC0	rural			

Appendix B Segmentation - Definitions

POPULATION SEGMENTS

Population is segmented by:

- Age / life stage (input)
- Age / life stage (forecasting and output)
- Gender
- Working status (for the 16-64 age groups only)

Age / life stage (input)	Age / life stage (forecasting / output)	Gender	Working status (for the 16 – 64 age groups only)
0 – 15 16 – 29 30 – 64 65 – 69 70 – 74 75 – 79 80 – 84 85+	0 – 15 16 – 29 30 – 64 65+	Male Female	Full time (≥ 30 hours per week) Part time (< 30 hours per week) Students (not working) Other non working

HOUSEHOLD SEGMENTS

Households are segmented by number of persons (not just adults). There are two segments:

- 1 person households
- 2+ person households

EMPLOYMENT SEGMENTS

Employment (jobs) are segmented by:

- sector
- gender
- working status / type

There are 12 employment sectors defined in the planning data forecasts. These relate to the trip attraction variables required by the trip end model. The definitions are as shown below. The gender and working status segmentation is as defined above for the population.

Employment type	SIC(92) code	Description
E03	801	Primary and Secondary Education
E04	802	Higher Education
E05	803, 804	Adult/ Other Education
E06	551, 552	Hotels, campsites etc
E07	501, 503, 505, 521-525, 5262, 5263, 55303	Retail trade
E08	851	Health / Medical
E09	502, 504, 527, 641, 6512, 703, 711, 714, 852, 853, 93	Services (business and other) & equipment rental & repair household goods & postal / courier services
E10	10-45, 51, 60-62, 631, 632, 634, 90	Industry, Construction & transport
E11	55301, 55302, 554	Restaurants & bars
E12	63303, 91, 9213, 923, 925-927	Recreation & sport
E13	01, 02, 05	Agriculture & fishing
E14	Other	Business

Appendix C Source of Dwellings Input Assumptions (AMRs)

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Adur District Council	http://www.adur.gov.uk/docs/planning/adur-development-plan/annual-monitoring-report-dec-2010.pdf	Dec-10	2026
Arun DC	http://www.arun.gov.uk/assets/Planning/Policy_from_2010/Annual_Monitoring_Report/Annual_Monitoring_Report_2009-10_Bookmarked.pdf	Dec-10	2025/6
Ashford DC	http://www.ashford.gov.uk/pdf/Final%20AMR%2009-10.pdf	2010	2021
Aylesbury Vale DC		30/09/2009	
Basingstoke and Deane BC	http://www.basingstoke.gov.uk/NR/rdonlyres/B910F948-C4D1-418D-B874-8CE036ACAAC3/0/AMR2010FINAL.pdf	AMR 2010, undated	2020/21
Bracknell Forest BC	http://www.bracknell-forest.gov.uk/bracknell-forest-annual-monitoring-report-2009-to-2010.pdf	2011	2025/26
Brighton & Hove Council	http://www.brighton-hove.gov.uk/downloads/bhcc/ldf/AMR_2009-10.pdf	AMR 2009-2010	2024/25
Canterbury Council	http://www.canterbury.gov.uk/assets/localplan/AMR-Apr09-Mar10%20Finalc.pdf	undated	2014/15
Cherwell DC	http://www.cherwell.gov.uk/media/pdf/q/c/AMR_2010.pdf	Nov-10	2025/26
Chichester DC	http://www.chichester.gov.uk/index.cfm?articleid=5102	2009	2014/15
Chiltern DC	http://www.chiltern.gov.uk/downloads/9_Housing_2008-09_Complete.pdf	Dec-09	2025
Crawley BC	http://www.crawley.gov.uk/stellent/groups/public/documents/report/int201796.pdf	2010	2025/2026
Dartford BC	http://www.dartford.gov.uk/planningpolicy/documents/AMR2008-09GOSEversion.pdf	Dec-09	2025/26
Dover DC	http://www.dover.gov.uk/pdf/AMR%202009%20to%202010.pdf	Dec-10	2025/26
East Hampshire DC	http://www.easthants.gov.uk/ehdc/formsfordownload.nsf/0/CB33842F5A71FF6B802577F80035A525/$File/AMR+Final+version.pdf;	Dec-10	2027/28
Eastbourne BC	http://www.eastbourne.gov.uk/EasySiteWeb/getresource.axd?AssetID=147532&type=full&servicetype=Inline	Dec-10	2026/27
Eastleigh BC	http://www.eastleigh.gov.uk/PDF/2009-2010AnnualMonitoringReport.pdf	Dec-10	2006-2014
Elmbridge BC	http://www.elmbridge.gov.uk/documents/detail.htm?pk_document=18977	09/10	2004-2025
Epsom and Ewell BC	http://www.epsom-ewell.gov.uk/NR/rdonlyres/B092A08A-9D47-4AC3-8C7D-B696CC4A628B/0/AnnualMonitoringReport200910.pdf	09/10	2001-2025
Fareham BC	http://www.fareham.gov.uk/pdf/planning/amr2010.pdf	Dec-10	2005-2025
Gosport BC	http://www.gosport.gov.uk/sections/your-council/council-services/planning-section/annual-monitoring-report/	Nov-10	2005-2025
Gravesham BC	http://www.gravesham.gov.uk/media/pdf/t/c/Gravesham_Annual_Monitoring_Report_2010_Revised.pdf	Dec-10	2006-2025
Guildford BC	http://www.guildford.gov.uk/CHttpHandler.ashx?id=7559&p=0	09/10	2001-2009
Hart DC	http://www.hart.gov.uk/final_amr_for_hart_dc_december_2010.pdf	Dec-10	2004-2025
Hastings BC	http://www.hastings.gov.uk/ldf/amr2009_2010.pdf	Dec-10	2004-2025
Havant BC	http://www.havant.gov.uk/PDF/AMR%202010%20opt%20for%20web.pdf	Dec-10	2001-2025
Horsham DC	http://www.horshamdistrictldf.info/Files/AMR_0809.pdf	Dec-09	2001-2025
Isle of Wight	http://www.iwight.com/living_here/planning/images/2AMR08_09.pdf	Dec-09	2005-2025
Lewes DC	http://www.lewes.gov.uk/Files/plan_AMR_2010.pdf	09/10	2003-2025

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Maidstone BC	http://www.maidstone.gov.uk/pdf/101214%20AMR%20final%20with%20cover.pdf	Dec-10	2004-2009
Medway Council	http://www.medway.gov.uk/pdf/AMR%202010%20vol1.pdf	Dec-10	2006-2027
Mid Sussex DC	http://www.midsussex.gov.uk/Nimoi/sites/msdcpublic/resources/AMR%202008%20-%202009%20Final%20_addendum_1.pdf	08/09	2004-2025
Milton Keynes Council	http://www.miltonkeynes.gov.uk/planning-policy/documents/MK_2009-10_AMR_%282%29.pdf	Dec-10	2004-2025
Mole Valley DC	http://www.molevalley.gov.uk/media/pdf/9/8/Merged_AMR.pdf	09/10	2004-2025
New Forest DC	http://www.newforest.gov.uk/index.cfm?articleid=6618&articleaction=dispmedia&mediaid=10106	Dec-09	2004-2025
New Forest National Park Authority	http://www.newforestnpa.gov.uk/final_amr_2010.pdf	Nov-10	2001-2025
Oxford Council	http://www.oxford.gov.uk/Direct/AnnualMonitoringReport200910.pdf	Dec-10	2001-2025
Portsmouth Council	http://www.portsmouth.gov.uk/media/AMR2010.pdf	Dec-10	2004-2026
Reading BC	http://ww2.reading.gov.uk/documents/servingyou/planning/local_development_framework/Annual_Monitoring_Report_2010.pdf	Dec-10	2002-2025
Reigate & Banstead	http://www.reigate-banstead.gov.uk/Images/AMR%202009_tcm9-39500.pdf	2008-2009	2003-2025
Rother DC	http://www.rother.gov.uk/media/pdf/8/4/AMR_FINAL.pdf	Dec-10	2004-2025
Runnymede BC	http://www.runnymede.gov.uk/portal/binary/com.epicentric.contentmanagement.servlet.ContentDeliveryServlet/RBC%2520Portal/LGCL%2520Categories/Environment/Land%2520%2526%2520premises/Planning/Local%2520Development%2520Framework/AMR_0809.pdf	AMR 2008/09	2001-2025
Rushmoor BC	http://www.rushmoor.gov.uk/media/adobepdf/i/9/FINAL_AMR_2010.pdf	Dec-10	2001-2026
Sevenoaks DC	http://www.sevenoaks.gov.uk/documents/amr_2010_.pdf	Dec-10	2006-2025
Shepway DC	http://www.shepway.gov.uk/UserFiles/File/pdf/local-plan/annual-monitoring-report/Shepway%20AMR%202010.pdf	09/ 10	2005-2015
Slough BC	http://www.slough.gov.uk/documents/AMR_09-10_Web_Vn.pdf	Dec-10	2006-2025
South Buckinghamshire DC	http://www.southbucks.gov.uk/includes/documents/cm_docs/2011/a/annualmonitoringreportcovering200910.pdf	Dec-10	2006-2025
South Oxfordshire DC	http://www.southoxon.gov.uk/ccm/content/planning/local-plan/annual-monitoring-report.en	09/10	2006-2025
Southampton Council	http://www.southampton.gov.uk/Images/Southampton%20CC%20AMR%202009-10_tcm46-279848.pdf	09/10	2001-2025
Spelthorne BC	http://www.spelthorne.gov.uk/annual_monitoring_report_2010_final.pdf	Nov-10	2004-2025
Surrey Heath BC	http://www.surreyheath.gov.uk/planning/planningpolicyandconservation/AMR.htm?textsize=1	Dec-10	2001-2025
Swale BC	http://www.swale.gov.uk/assets/Planning-General/Planning-Policy/Annual-Monitoring-Report/Swale-Borough-Council-AMR-09-10-with-cover.pdf	09/10	2006-2025
Tandridge DC	http://www.tandridge.gov.uk/yourcouncil/documents/document_display.htm?pk_document=2800	Dec-10	2003-2025
Test Valley BC	http://www.testvalley.gov.uk/pdf/Annual%20Monitoring%20Report%2009-10(1).pdf	Dec-10	2006-2025
Thanet DC	http://www.thanet.gov.uk/environment__planning/planning/ldf_and_local_plan/local_development_framework-	08/09	2001-2025

Local Planning Authority	*Website*	*Document Date*	*Projection years*
	1/annual_monitoring_report/annex_3_housing_trajectory.aspx		
Tonbridge and Malling BC	http://www.tmbc.gov.uk/assets/planning_policy/LDF/AMR2009_FINAL_211209.pdf	08/09	2006-2020
Tunbridge Wells BC	http://www2.tunbridgewells.gov.uk/pdf/PP_AMR_December_2010.pdf	Dec-10	2006-2025
Vale of White Horse DC	http://www.whitehorsedc.gov.uk/Images/AMR%202009-10%20final_tcm4-8200.pdf	Dec-10	2006-2025
Waverley BC	http://www.waverley.gov.uk/downloads/file/1540/annual_monitoring_report_amr_2008-09-main_report	08/09	2006-2024
Wealden DC	http://www.wealden.gov.uk/Wealden/Planning_and_Building_Control/Planning_Policy/Local_Development_Framework	09/10	2004-2015
West Berkshire DC	http://www.westberks.gov.uk/CHttpHandler.ashx?id=21560&p=0	Dec-09	2002-2024
West Oxfordshire DC	https://www.westoxon.gov.uk/files/download/7935-4212.pdf	Dec-10	2006-2019
Winchester Council	http://www.winchester.gov.uk/Documents/LDF/AMR%202010/AnnualMonitoringReport2010.pdf	Dec-10	2004-2025
Windsor & Maidenhead	http://www.rbwm.gov.uk/public/pp_amr2010_report.pdf	Dec-10	2005-2025
Woking BC	http://www.woking.gov.uk/planning/policy/ldf/amr/amr200910.pdf	Dec-10	2003-2026
Wokingham DC	http://www.wokingham.gov.uk/planningcontrol/planning/planningpolicies/ldf/amr/?assetdetesctl3161295=182845	Dec-10	2001-2025
Worthing BC	http://www.worthing.gov.uk/worthings-services/planningandbuildingcontrol/planningpolicy/localdevelopmentframework/annualmonitoringreport/pdffile,76728,en.pdf	Dec-10	2003-2025
Wycombe DC	http://www.wycombe.gov.uk/council-services/planning-and-building/planning-policy/wycombe-development-framework.aspx	Dec-10	2001-2025
Babergh DC	http://www.babergh-south-suffolk.gov.uk/NR/rdonlyres/A3F24CF9-E9B4-4BBF-8F05-E38B986B0CEB/0/AMR20092010.pdf	AMR 2009-2010	to 20/21
Basildon DC	http://www.basildon.gov.uk/CHttpHandler.ashx?id=2114&p=0	2009	to 2024/2025
Bedford BC	http://www.bedford.gov.uk/environment_and_planning/planning_town_and_country/planning_policy/annual_monitoring_report.aspx	Dec-10	to 2015/2016
Braintree DC	http://www.braintree.gov.uk/NR/rdonlyres/4CE7CBE7-7775-4FC7-92F0-87085D5F460D/0/finalreport.pdf	1/4/09 - 31/3/10	to 2025/2026
Breckland DC	http://80.82.124.74/sites/default/files/legacy_files/breckland_amr_2009.pdf	2009	to 2025/2026
Brentwood BC	http://www.brentwood.gov.uk/index.php?cid=880	Dec-10	to 2024/2025
Broadland	http://www.broadland.gov.uk/PDF/AMR_09-10_22.12.10.pdf	09/10	2001-2025
Broads Authority	http://www.broads-authority.gov.uk/broads/live/planning/future-planning-and-policies/local-development-framework/Annual_Monitoring_Report__2009-2010.pdf	Autumn 2010	2007-2023
Broxbourne BC	http://www.broxbourne.gov.uk/pdf/AMR%202009-2010%20(Dec%2010)_Part1.pdf	Dec-10	2001-2025
Cambridge Council	http://www.cambridge.gov.uk/public/docs/Annual-Monitoring-Report-2010.pdf	Dec-10	to 2020/2021
Castle Point DC	http://www.castlepoint.gov.uk/file/AMR_Final_08_09.pdf	2008/2009	to 2024/2025
Central Bedfordshire Council	http://www.centralbedfordshire.gov.uk/images/LDF%20AMR%20(North)%20Dec%202010_tcm5-35791.pdf	Dec-10	2001-2025

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Chelmsford BC	http://www.chelmsford.gov.uk/index.cfm?articleid=11653	Dec-10	to 2021
Colchester BC	http://www.colchester.gov.uk/Info_page_two_pic_2_det.asp?art_id=2880&sec_id=1286	Dec-10	to 2023/2024
Dacorum BC	http://www.dacorum.gov.uk/pdf/strategicPlanning-10.12.23-AMR-2010_Final.pdf	Dec-10	to2030/2031
East Cambridgeshire DC	http://www.eastcambs.gov.uk/sites/default/files/ldf/annual_monitoring_report_2009_30107.pdf	Dec-09	to 2024/2025
East Hertfordshire DC	http://www.eastherts.gov.uk/index.jsp?articleid=11714	Dec-10	to 2025/2026
Epping Forest DC	http://www.eppingforestdc.gov.uk/Library/files/planning/Local_Development_Framework/Evidence_Base/AMRs/EFDC%20AMR%20final%202009.pdf	Dec-09	2001-2020
Fenland DC	http://www.fenland.gov.uk/ccm/content/development-policy/ldf/amr/amr2008-09.en	Dec-09	2001-2025
Forest Heath DC	http://www.forest-heath.gov.uk/NR/rdonlyres/D8FB4B9C-BB3F-4998-9866-3EAFC4E41683/0/AMR20092010FINAL.pdf	Dec-10	2001-2030
Great Yarmouth BC	http://www.great-yarmouth.gov.uk/2009-amr-master.pdf	('08/'09 report)	2001-2024
Harlow DC	http://www.harlow.gov.uk/pdf/Annual%20Monitoring%20Report%202009%20V3.pdf	09/10	2001-2020
Hertsmere BC	http://www.hertsmere.gov.uk/planning/dnld_200074/FINALAMR2008_09.pdf?action=open	Dec-09	2001-
Huntingdonshire DC	http://www.huntingdonshire.gov.uk/SiteCollectionDocuments/HDCCMS/Documents/Planning%20Documents/PDF%20Documents/Local%20Development%20Framework/AMR%20December%202010.pdf	Dec-10	2001-2025
Ipswich BC	http://www.ipswich.gov.uk/downloads/Ipswich_AMR_2009-10.pdf	Dec-10	2001-2025
Kings Lynn & West Norfolk BC	http://www.west-norfolk.gov.uk/pdf/Kings%20Lynn%20and%20West%20Norfolk%20AMR%20dec%202010.pdf	Dec-10	2009-2025
Luton and South Bedfordshire Joint Planning Committee	http://www.shapeyourfuture.org.uk/documents/LutonandsouthernCentralBedsAMR0910.pdf	09/10	2001-2025
Maldon DC	http://www.maldon.gov.uk/NR/rdonlyres/C55F33E8-9F6E-4486-A098-07F8A31C2920/13792/AMR2010.pdf	Dec-10	2001-2009
Mid Suffolk DC	http://www.midsuffolk.gov.uk/NR/rdonlyres/074F136F-DBF9-4FFB-80D7-68024EE577D6/0/AnnualMonitoringReport2009.pdf	Dec-09	2001-2024
North Hertfordshire DC	http://www.north-herts.gov.uk/annual_monitoring_report_2009-2010.pdf	Dec-10	2001-2030
North Norfolk DC	http://www.northnorfolk.org/ldf/documents/Annual_Monitoring_Report_2008-2009.pdf	Dec-09	2001-2023
Norwich Council	http://www.norwich.gov.uk/intranet_docs/A-Z/Planning%20Policy/AMR_09_10.pdf	Dec-10	2001-2024
Peterborough Council	http://www.peterborough.gov.uk/PDF/env-plan-research-Pboro%20LDF%20AMR%202010.pdf	Dec-10	2002-2024
Rochford DC	http://www.rochford.gov.uk/pdf/planning_evibase_annual_monitoring_report0910.pdf	Dec-10	2009-2030
South Cambridgeshire DC	http://www.scambs.gov.uk/documents/retrieve.htm?pk_document=909653	Dec-10	2001-2024
South Norfolk	http://www.south-norfolk.gov.uk/planning/media/LDF_Annual__Monitoring_Report_2009-10.pdf	Dec-10	2001-2024

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Southend-on-Sea BC	http://www.southend.gov.uk/downloads/download/232/annual_monitoring_report	Dec-09	2001-2022
St Albans Council	http://www.stalbans.gov.uk/Images/Annual%20Monitoring%20Report%202010_tcm15-15454.pdf	Dec-10	2001-2027
St Edmundsbury BC	http://www.stedmundsbury.gov.uk/sebc/live/pdf/planning/helpdesk/FINAL%20AMR%200910%20SMALL%20FILE%2003.12.10.pdf	Dec-10	2001-2030
Stevenage BC	http://www.stevenage.gov.uk/planningandregeneration/planningregulationsandpolicy/ldf/dnld_ldf/Annual_Monitoring_Report_2010.pdf	Sep-10	2001-2020
Suffolk Coastal DC	http://www.suffolkcoastal.gov.uk/NR/rdonlyres/1D4F13DE-85F8-46DB-A5B0-E11169A191A6/0/SCDCAnnualMonitoringReport2010.pdf	Dec-10	2001-2026
Tendring DC	http://www.tendringdc.gov.uk/NR/rdonlyres/1ED82123-AE46-4C69-9CEB-CA1A066959AF/7998/TDC2009AMRFinalVersionwithAppendicesandCover.pdf	Dec-09	2001-2025
Three Rivers DC	http://www.threerivers.gov.uk/GetResource.aspx?file=Annual Monitoring Report 2008_09.pdf	Dec-09	2001-2025
Thurrock Council	http://www.thurrock.gov.uk/planning/strategic/pdf/monitor_annual_2010.pdf	Dec-10	2001-2025
Uttlesford DC	http://www.uttlesford.gov.uk/uttlesford/file/Annual%20Monitoring%20Report%2010.pdf	Dec-10	2001-2025
Watford BC	http://www.watford.gov.uk/ccm/content/planning-and-development/watford-annual-monitoring-report-2010.en	09/10	2001-2030
Waveney DC	http://www.waveney.gov.uk/NR/rdonlyres/793E5B28-50C5-4A20-8A70-159FC99DBCCB/0/AMR200910FinalVersion.pdf	Dec-10	2001-2024
Welwyn Hatfield DC	http://www.welhat.gov.uk/CHttpHandler.ashx?id=3515&p=0	Dec-10	2001-2025
Barking & Dagenham LBC	http://www.barking-dagenham.gov.uk/8-leisure-envir/planning/local-dev-framework/pdf/monitoring-report-0910-main.pdf	Dec-10	2001-2024
Barnet LBC	http://www.barnet.gov.uk/annual-monitoring-report-2009-10.pdf	Dec-10	2001-2025
Bexley LBC	http://www.bexley.gov.uk/CHttpHandler.ashx?id=5561&p=0	Dec-09	2003-2024
Brent	http://www.brent.gov.uk/tps.nsf/Files/LBBA-820/$FILE/AMR%20200809.pdf	08/09	2003-2024
Bromley LBC	http://www.bromley.gov.uk/environment/planning/planningpolicy/ldf/Bromley+Annual+Monitoring+Report.htm	Dec-09	2004-2015
Camden LBC	http://www.camden.gov.uk/ccm/content/environment/planning-and-built-environment/development-plans-and-policies/local-development-framework/evidence-base-and-monitoring.en;jsessionid=85CCF11CF0ED46B7D519E60E746A4DFB	09/10	2005-2025
City of London	http://www.cityoflondon.gov.uk/NR/rdonlyres/F0EE446C-D872-4D5D-9BC5-5F12CB4F2092/0/DP_PL_CityofLondonAMR.pdf	08/09	2001-2015
Croydon LBC	http://www.croydon.gov.uk/contents/departments/planningandregeneration/pdf/912686/amr0910final	09/10	2001-2020
Ealing LBC	http://www.ealing.gov.uk/ealing3/export/sites/ealingweb/services/environment/planning/planning_policy/local_development_framework/amr/_docs/amr_2009-2010.pdf	Dec-10	2003-2030
Enfield LBC	http://www.enfield.gov.uk/downloads/file/1859/annual_monitoring_report_april_08-march_09	Jan-10	2003-2024
Greenwich LBC	http://www.greenwich.gov.uk/Greenwich/Strategies/LandAndBuildingDevelopmentPlan/AnnualMonitoringReport.htm	09/10	2001-2019

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Hackney LBC	http://www.hackney.gov.uk/Assets/Documents/Annual-Monitoring-Report-2009-10.pdf	Oct-10	2006-2025
Hammersmith & Fulham LBC	http://www.lbhf.gov.uk/Images/AMR%202010%20website_tcm21-154853.pdf	Dec-10	2002-2024
Haringey LBC	http://www.haringey.gov.uk/annual_monitoring_report_2008-09.pdf	Dec-09	2001-2025
Harrow LBC	http://www.harrow.gov.uk/downloads/file/8881/annual_monitoring_report_december_2010	Dec-10	2004-2025
Havering LBC	http://www.havering.gov.uk/CHttpHandler.ashx?id=20335&p=0	Dec-09	2003-2023
Hillingdon LBC	http://www.hillingdon.gov.uk/media/pdf/o/2/LB_Hillingdon_AMR_2009-2010.pdf	Dec-10	2004-2025
Hounslow LBC	http://www.hounslow.gov.uk/ldf_amr_2010.pdf	Dec-10	2004-2025
Islington LBC	http://www.islington.gov.uk/DownloadableDocuments/Environment/Pdf/ldf_pack/Annual_Monitoring_Report_2009.pdf	Dec-09	2002-2024
Kensington & Chelsea LBC	http://www.rbkc.gov.uk/planningandconservation/planningpolicy/annualmonitoringreport.aspx	Dec-10	2002-2023
Kingston Upon Thames LBC	http://www.kingston.gov.uk/rbk_2010_amr__small_web_version_-2.pdf	Dec-10	2004-2024
Lambeth LBC	http://www.lambeth.gov.uk/NR/rdonlyres/3CDFED5B-A4D3-4C78-8D03-6E3683EA784B/0/LambethAnnualMonitoringReport200910.pdf	09/10	2003-2024
Lewisham LBC	http://www.lewisham.gov.uk/NR/rdonlyres/499499AA-6B85-4980-9112-5F0A9CD04A1D/0/AMR200910.pdf	09/10	2004-2025
Merton LBC	http://www.merton.gov.uk/living/planning/planningpolicy/ldf/merton_amr_08_09_-_full_version.pdf	08/09	2003-2017
Newham LBC	http://www.newham.gov.uk/NR/rdonlyres/E749857E-5679-44B5-8674-7222E3E7D60E/0/LocalDevelopmentFrameworkAnnualMonitoringReport20092010.pdf	09/10	2002-2026
Redbridge LBC	http://www.redbridge.gov.uk/cms/planning_land_and_buildings/planning_policy__regeneration/local_development_framework/ldf_annual_report.aspx	Dec-10	2001-2016
Richmond Upon Thames LBC	http://www.richmond.gov.uk/richmond_2009-2010_amr.pdf	Dec-10	2001-2025
Southwark LBC	http://www.southwark.gov.uk/downloads/download/1860/annual_monitoring_report_amr	Dec-10	2001-2025
Sutton LBC	http://www.sutton.gov.uk/index.aspx?articleid=2339	Dec-09	2006-2023
Tower Hamlets LBC	http://www.towerhamlets.gov.uk/lgsl/851-900/856_local_development_framewor/annual_monitoring_report.aspx	08/09	2003-2024
Waltham Forest LBC	http://www.walthamforest.gov.uk/final-amr-09-10.pdf	Dec-10	2004-2025
Wandsworth LBC	http://www.wandsworth.gov.uk/downloads/file/3891/annual_monitoring_report_amr_200910	09/10	2004-2025
Westminster LBC	http://www3.westminster.gov.uk/docstores/publications_store/Copy%20of%20AMR%202008-09.pdf	Dec-09	2006-2015
Darlington BC	http://www.darlington.gov.uk/dar_public/documents/Development%20and%20Environment/Development%20and%20Regeneration/Planning%20Services/Policy/AMR_200910_FINAL_DOCUMENT_App_1_separate.pdf	Dec-10	2004-2025
Durham Council	http://content.durham.gov.uk/PDFRepository/AnnualMonitoringReportDuhamCountyCouncil200809.pdf	08/09	2004-2023

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Gateshead	http://www.gateshead.gov.uk/DocumentLibrary/Building/Strategies/AMR/Gateshead CouncilAnnualMonitoringReport20082009.pdf	Dec-09	2004-2024
Hartlepool BC	http://www.hartlepool.gov.uk/downloads/file/6887/annual_monitoring_report_2009-10	Dec-10	2004-2020
Middlesbrough BC	http://www.middlesbrough.gov.uk/public/Planning/LDF%20pdfs/AMR%202009-10.pdf	Dec-10	2004-2025
Newcastle Upon Tyne Council	http://www.newcastle.gov.uk/wwwfileroot/regen/ldf/AMR_2008_09.pdf	08/09	2004-2029
North Tyneside MBC	http://www.northtyneside.gov.uk/pls/portal/NTC_PSCM.PSCM_Web.download?p_ID=515173	Dec-09	2004-2025
Northumberland Council	http://www.northumberland.gov.uk/default.aspx?page=3459	Dec-10	2004-2015
Northumberland NP	http://www.northumberlandnationalpark.org.uk/state_of_the_park_report_2010.pdf	Jun-10	
Redcar & Cleveland BC	http://www.redcar-cleveland.gov.uk/main.nsf/608BBE195DFBD9ED8025717200386C67/$FILE/AMR%20Final%20version%2009-10.pdf	Dec-10	2005-2025
South Tyneside MBC	http://www.southtyneside.info/CHttpHandler.ashx?id=9868&p=0	Dec-10	2004-2020
Stockton-on-Tees BC	http://www.stockton.gov.uk/resources/planning/amr/AMR20092010.pdf	Dec-10	2004-2024
Sunderland Council	http://www.sunderland.gov.uk/CHttpHandler.ashx?id=2039&p=0	Dec-09	2004-2023
Allerdale DC	http://www.allerdale.gov.uk/downloads/page1010/AMR_2009-2010(Read-Only).pdf	Dec-10	2003-2026
Barrow-in-Furness BC	http://www.barrowbc.gov.uk/pdf/AMR%202009-10%20Final.pdf	Dec-10	2003-2024
Blackburn with Darwen BC	http://www.blackburn.gov.uk/upload/pdf/AMR5_final_20100326105259.pdf	Dec-09	2003-2020
Blackpool Council	http://www.blackpool.gov.uk/NR/rdonlyres/E666ECE4-C7BF-458A-9C18-2AB50AC60069/0/FinalAMR10withFrontCover.pdf	Dec-10	2003-2020
Bolton MBC	http://www.bolton.gov.uk/sites/DocumentCentre/Documents/Annual%20Monitoring%20Report%202008-2009%20New.pdf	Dec-09	2003-2025
Burnley BC	http://www.burnley.gov.uk/site/scripts/download_info.php?fileID=3595&PHPSESSID=b09fc7e9ee69ff4f97a83ac847987d6b	Dec-10	2003-2020
Bury MBC	http://www.bury.gov.uk/NR/rdonlyres/F7B49252-F799-4B34-BD4A-81AF9BF2B641/0/AnnualMonitoringReport2010.pdf	Dec-10	2003-2025
Carlisle	http://www.carlisle.gov.uk/pdf/amr2009.pdf	Dec-09	2001-2023
Cheshire East	http://www.cheshireeast.gov.uk/environment_and_planning/planning/spatial_planning/local_development_framework/annual_monitoring_report.aspx	Dec-10	2001-2025
Cheshire West and Chester	http://www.cheshirewestandchester.gov.uk/planning/spatial_planning/ldf/annual_monitoring_report.aspx	08/09	2003-2020
Chorley	http://www.chorley.gov.uk/CHttpHandler.ashx?id=3619&p=0	08/09	2003-2023
Copeland DC	http://www.copelandbc.gov.uk/pdf/AMR%20final%20for%20web1.pdf	09/10	2003-2020
Eden DC	http://www.eden.gov.uk/planning-and-development/eden-local-development-framework/annual-monitoring-report/	Dec-09	2005-2024
Fylde BC	http://www.fylde.gov.uk/local-plan/local-development-framework/annual-monitoring-report/	Dec-10	2003-2020
Halton BC	http://www2.halton.gov.uk/pdfs/environment/planning/annualmonitoring2009	Dec-09	2003-2020

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Hyndburn BC	http://www.hyndburnbc.gov.uk/downloads/AMR09-10.pdf	Dec-10	2003-2024
Knowsley MBC	http://www.knowsley.gov.uk/pdf/2010KnowsleyAMRFinal.pdf	Dec-10	2002-2026
Lake District NP	http://www.lakedistrict.gov.uk/lake_district_docs95/amr_0910.pdf	09/10	2003-2020
Lancaster Council	http://www.lancaster.gov.uk/planning-environment/forward-planning/local-development-framework/annual-monitoring-report/	Dec-10	2003-2024
Liverpool Council	http://www.liverpool.gov.uk/Images/tcm21-169655.pdf	08/09	2003-2023
Manchester Council	http://www.manchester.gov.uk/downloads/download/972/annual_monitoring_report	08/09	2003-2020
Oldham MBC	http://www.oldham.gov.uk/localdf-annual-monitoring-report-2010.pdf	Dec-10	2003-2030
Pendle BC	http://www.pendle.gov.uk/downloads/file/5919/annual_monitoring_report_200910	Dec-10	2003-2020
Preston BC	http://www.preston.gov.uk/environment-and-planning/planning/planning-policies/local-development-framework/annual-monitoring-report/	Dec-09	2003-2023
Ribble Valley BC	http://www.ribblevalley.gov.uk/downloads/file/7354/annual_monitoring_report_2010	Dec-10	
Rochdale MBC	http://www.rochdale.gov.uk/pdf/2010-04-30_LDF_AMR_December_2009.pdf	Dec-09	2003-2025
Rossendale BC	http://www.rossendale.gov.uk/downloads/AMR_2009-2010.pdf	Dec-10	2003-2025
Salford Council	http://www.salford.gov.uk/planning-annual-monitoring-report.htm	Dec-10	2003-2024
Sefton MBC	http://www.sefton.gov.uk/pdf/PERD_2010_AMR.pdf	Dec-10	2003-2020
South Lakeland DC	http://www.southlakeland.gov.uk/downloads/page2028/AMR_2010.pdf	Dec-10	2003-2024
South Ribble	http://www.southribble.gov.uk/upload/public/attachments/35/2010_amr_report.pdf	Dec-10	2003-2020
St Helens MBC	http://localdevelopment.sthelens.gov.uk/SITEMAN/publications/31/AMR_2009_Amended_Feb10.pdf	Dec-09	2003-2024
Stockport MBC	http://stockport-consult.limehouse.co.uk/portal/pp/zzz_adopteddocuments/aaa_ldsamrsci/amr_1/amr	Dec-10	2005-2024
Tameside MBC	http://www.tameside.gov.uk/planning/ldf/annualmonitoring	Dec-09	2003-2023
Trafford MBC	http://www.trafford.gov.uk/cme/live/dynamic/DocMan2Document.asp?document_id=30B134BE-3ED7-4A5A-943A-B6CAF2A1F0B9	Dec-10	2003-2025
Warrington BC	http://www.warrington.gov.uk/content_documents/Documents/Planning/Latest_AMR.pdf	08/09	2003-2020
West Lancashire DC	http://www.westlancsdc.gov.uk/PDF/Final_AMR2010.pdf	Dec-10	2001-2022
Wigan MBC	http://www.wigan.gov.uk/NR/rdonlyres/DF12BDD8-682E-44C0-B556-31116BA7917F/0/FifthAnnualMonitoringReport1305kb.pdf	Dec-09	2002-2020
Wirral MBC	http://www.wirral.gov.uk/my-services/environment-and-planning/planning/local-development-framework/annual-monitoring-reports	09/10	2003-2020
Wyre BC	http://www.wyrebc.gov.uk/Page.aspx?PgeID=73766	Dec-10	2003-2020
Bath & NE Somerset Council	http://www.bathnes.gov.uk/SiteCollectionDocuments/Environment%20and%20Planning/Planning/planning%20policy/Annual%20Monitoring%20Report%202009-10.pdf	Dec-10	2003-2025
Bournemouth BC	http://www.bournemouth.gov.uk/Library/PDF/Living/Planning/Planning_Policy/Local/AMR_200910/2009-10_AMR_FINAL_WEB.pdf	Dec-10	2001-2025
Bristol Council	http://www.bristol.gov.uk/ccm/cms-service/stream/asset/?asset_id=36038163	09/10	2002-2016
Cheltenham	http://www.cheltenham.gov.uk/downloads/FINAL_AMR_2010__23.12.10.pdf	Dec-10	2003-2025

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Christchurch BC	http://www.dorsetforyou.com/media.jsp?mediaid=158684&filetype=pdf	Dec-10	2001-2025
Cornwall Council	http://www.cornwall.gov.uk/default.aspx?page=22474	09/10	2001-2015
Cotswold DC	http://consult.cotswold.gov.uk/portal/fp/amr/annual_monitoring_report_2008-2009?tab=files	Dec-09	2001-2024
Dartmoor NP	http://www.dartmoor-npa.gov.uk/__data/assets/pdf_file/0019/63028/AMR-2010.pdf	Dec-10	2004-2024
East Devon DC	http://www.eastdevon.gov.uk/plg_amrreport08-09.pdf	Dec-09	2001-2015
East Dorset	http://www.dorsetforyou.com/media.jsp?mediaid=158749&filetype=pdf	Dec-10	2003-2025
Exeter Council	http://www.exeter.gov.uk/index.aspx?articleid=4738	Dec-10	2002-2025
Exmoor NP	http://www.exmoor-nationalpark.gov.uk/amr_08-09_final.pdf	08/09	2002-2023
Forest of Dean DC	http://investforestofdean.org.uk/media/Assets/ForwardPlan/documents/Annual%20Monitoring%20Report/AMR_2010.pdf	Dec-10	2004-2019
Gloucester Council	http://www.gloucester.gov.uk/Documents/councilservices/Planning/localplan/LDF/gnelp1983/GloucesterCityAMR2010.pdf	09/10	2006-2025
Isles of Scilly Council	http://committees.scilly.gov.uk/mgConvert2PDF.aspx?ID=532	Dec-08	2003-2019
Mendip DC	http://www.mendip.gov.uk/Documents/Organisational%20Development/2009%20AMR.pdf	Dec-09	2006-2025
Mid Devon DC	http://www.middevon.gov.uk/index.aspx?articleid=4016	09/10	2001-2025
North Devon DC	http://www.northdevon.gov.uk/amr_2009.pdf	Dec-09	2001-2013
North Dorset DC	http://www.dorsetforyou.com/media.jsp?mediaid=158534&filetype=pdf	Dec-10	2004-2015
North Somerset Council	http://www.n-somerset.gov.uk/NR/rdonlyres/01545246-53A9-40AF-A931-12BB6AF77CB9/0/NorthSomersetAMR2009FINAL.pdf	08/09	2006-2025
Plymouth Council	http://www.plymouth.gov.uk/amr2009.pdf	08/09	2002-2025
Poole	http://www.boroughofpoole.com/downloads/assets/Annual_Monitoring_Report_2010.pdf	Dec-10	2006-2027
Purbeck DC	http://www.dorsetforyou.com/media.jsp?mediaid=148639&filetype=pdf	Dec-09	2001-2025
Sedgemoor DC	http://www.sedgemoor.gov.uk/CHttpHandler.ashx?id=7580&p=0	Dec-10	2006-2025
South Gloucestershire Council	http://www.southglos.gov.uk/NR/rdonlyres/F775B83A-F14A-427D-A5A5-DE9A1CC4C3A9/0/PTE100296.pdf	Dec-10	2006-2025
South Hams DC	http://www.southhams.gov.uk/amr_2010_final.pdf	Dec-10	2001-2015
South Somerset DC	http://ww2.southsomerset.gov.uk/media/pdf/d/i/AMR_2008-2009_DX_07.01.10.pdf	Dec-09	2009-2024
Stroud DC	http://www.stroud.gov.uk/info/localplan/annual_monitoring_report09.pdf	Dec-09	2003-2025
Swindon BC	http://www.swindon.gov.uk/amr_report-2.pdf	08/09	2003-2025
Taunton Deane BC	http://www.tauntondeane.gov.uk/irj/go/km/docs/CouncilDocuments/TDBC/Documents/Forward%20Planning/Annual%20Monitoring%20Report%202010.pdf	09/10	2006-2025
Teignbridge DC	http://www.teignbridge.gov.uk/CHttpHandler.ashx?id=28094&p=0	Dec-10	2001-2015
Tewkesbury	http://www.tewkesbury.gov.uk/media/pdf/j/j/LDF_Annual_Monitoring_Report_2008-_20009.pdf	Dec-09	2003-2025
Torbay Council	http://www.torbay.gov.uk/amr2009.pdf	Dec-09	2001-2026
Torridge	http://www.torridge.gov.uk/CHttpHandler.ashx?id=6732&p=0	Dec-10	2001-2014

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West Devon BC	http://www.westdevon.gov.uk/upload/public/attachments/1088/AMR%20Final%2008%20Dec.pdf	Dec-10	2001-2025
West Dorset DC	http://www.dorsetforyou.com/media.jsp?mediaid=158272&filetype=pdf	Dec-10	2001-2009
West Somerset DC	http://www.westsomersetonline.gov.uk/getattachment/Planning---Building/Planning-Policy/Local-Development-Framework/Annual-Monitoring-Report/West-Somerset-LDF-Annual-Monitoring-2008-09.pdf.aspx	Dec-09	2001-2009
Weymouth and Portland BC	http://media.weymouth.gov.uk/docstore/planning/planningpolicy/AMR/POL_20100105_AMR.pdf	Dec-09	2002-2013
Wiltshire Council	http://consult.wiltshire.gov.uk/portal/spatial_planning/amr/annual_monitoring_report?tab=files	09/10	2001-2015
Birmingham Council	http://www.birmingham.gov.uk/cs/Satellite?c=Page&childpagename=Development-Planning%2FPageLayout&cid=1223092558807&pagename=BCC%2FCommon%2FWrapper%2FWrapper	08/09	2001-2013
Bromsgrove DC	http://www.bromsgrove.gov.uk/cms/pdf/AMR%202009.pdf, http://www.bromsgrove.gov.uk/cms/pdf/AMR%202010%20%20low%20res.pdf	Dec 09, Dec 10	2001-2025
Cannock Chase DC	http://www.cannockchasedc.gov.uk/downloads/Annual_Monitoring_Report_2009-2010.pdf	Dec-10	2003-3025
Coventry Council	http://www.coventry.gov.uk/ccm/navigation/environment/planning/local-development-framework/annual-monitoring-report/;jsessionid=aQOP63Lqqy79	Oct-09	2001-2025
Dudley	http://www.dudley.gov.uk/environment--planning/planning/planning-policy/local-development-framework/annual-monitoring-report	Dec-10	2006-2025
East Staffordshire BC	http://www.eaststaffsbc.gov.uk/Services/Planning%20Policy%20Annual%20Monitoring%20Reports/Annual%20Monitoring%20Report%202009.pdf	08/09	2001-2021
Herefordshire DC	http://www.herefordshire.gov.uk/docs/AMR_Complete(1).pdf	Dec-09	2001-2022
Lichfield DC	http://www.lichfielddc.gov.uk/downloads/AMR_2010_FINAL.pdf	Dec-10	2006-2025
Malvern Hills	http://www.malvernhills.gov.uk/cms/pdf/SWAMR%202010%20(final).pdf	Dec-10	2002-2025
Newcastle under Lyme	http://www.newcastle-staffs.gov.uk/Documents/Newcastle%20under%20Lyme%20AMR%202009_10.pdf	Dec-10	2006-2025
North Warwickshire BC	http://www.northwarks.gov.uk/site/scripts/documents_info.php?documentID=120&pageNumber=4	Dec-09	2002-2025
Nuneaton and Bedworth BC	http://www.nuneatonandbedworth.gov.uk/environment-planning/planning/planning-policy/local-development-framework/annual-monitoring-report	09/10	2001-2025
Redditch BC	http://redditch.whub.org.uk/cms/PDF/Annual%20Monitoring%20Report%2008-09.pdf	Dec-09	2001-2025
Rugby BC	http://www.rugby.gov.uk/downloads/AMR_2008-2009_final_21-1-2010.pdf	Dec-09	2001-2025
Sandwell MBC	http://www.sandwell.gov.uk/downloads/file/2009/annual_monitoring_report_200910	Dec-10	2002-2024
Shropshire Council	http://www.shropshire.gov.uk/planning.nsf/viewAttachments/EWET-8C4CU5/$file/shropshire-annual-monitoring-report-2009.pdf	08/09	2003-2025
Solihull MBC	http://www.solihull.gov.uk/Attachments/amr_2009.pdf	08/09	2001-2025
South Staffordshire DC	http://www.sstaffs.gov.uk/Files/SSDC%20AMR%20FINAL%202008-2009.pdf	08/09	2006-2025

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Stafford BC	http://www.staffordbc.gov.uk/live/Documents/Forward%20Planning/LDF/AMR-2009---10.pdf	09/10	2001-2020
Staffordshire Moorlands DC	http://www.staffsmoorlands.gov.uk/downloads/Staffordshire_Moorlands_Final_AMR_21_12_10.pdf	Nov-10	2001-2025
Stoke on Trent Council	http://www.stoke.gov.uk/ccm/cms-service/stream/asset/?asset_id=2296148	09/10	2006-2025
Stratford on Avon DC	http://www.stratford.gov.uk/files/seealsodocs/10535/Annual%20Monitoring%20Report%202009.pdf	Dec-09	2001-2025
Tamworth BC	http://www.tamworth.gov.uk/pdf/Annual_Monitoring_Report_2010.pdf	Dec-10	2006-2025
Telford and Wrekin Council	http://www.telford.gov.uk/downloads/AMR_2010.pdf	09/10	2006-2025
Walsall	http://www.walsall.gov.uk/annual_monitoring_report_2010.pdf	Dec-10	2004-2025
Warwick DC	http://www.warwickdc.gov.uk/NR/rdonlyres/2D4BCE31-FA3D-45F4-A0AA-1EBA8A8EF163/0/AMR2010withcovers.pdf	Dec-10	2001-2025
Wolverhampton	http://www.wolverhampton.gov.uk/NR/rdonlyres/F21EABF2-FF7E-4642-8862-3D40E8A0E167/0/WolverhamptonAMR2010Final.pdf	Dec-10	2001-2025
Worcester Council	http://www.malvernhills.gov.uk/cms/pdf/SWAMR%202010%20(final).pdf	Dec-10	2001-2015
Wychavon	http://www.malvernhills.gov.uk/cms/pdf/SWAMR%202010%20(final).pdf	Dec-10	2002-2025
Wyre Forest DC	http://www.wyreforestdc.gov.uk/cms/non-lgnl-pages/planning-and-regulatory-servic/planning-policy/monitoring-reports.aspx	Dec-10	2004-2025
Barnsley MBC	http://www.barnsley.gov.uk/amr-2009-1	AMR 2008/2009	to 26/27
Bradford DC	http://www.bradford.gov.uk/NR/rdonlyres/A9068B78-9007-42FE-8BAB-7F35D9A0276A/0/AMRDOCUMENTDEC2010.pdf	Dec-10	None provided
Calderdale MBC	http://www.calderdale.gov.uk/environment/planning/development-framework/monitoring-report09.pdf	AMR 2008/2009	to 25/26
Craven DC	http://www.cravendc.gov.uk/NR/rdonlyres/0B3E7E70-FF78-4AFF-AD78-638AD0D0E004/4674/FinalAMR0910forwebsite.pdf	Dec-10	to 25/26
Doncaster MBC	http://www.doncaster.gov.uk/Images/Annual%20Monitoring%20Report%202010_tcm2-75715.pdf	Dec-10	to 25/26
East Riding of Yorkshire Council	http://www.eastriding.gov.uk/corp-docs/forwardplanning/docs/monitoring/amr/AMR2010.pdf	Dec-10	to 25/26
Hambleton DC	http://www.hambleton.gov.uk/Hambleton%20District%20Council/Planning/LDF/AMR2010.pdf	Dec-10	to 25/26
Harrogate BC	http://www.harrogate.gov.uk/pdf/DS-P-LDF_AnnualMonitoringReport_09_B.pdf	AMR 2008/2009	to 23/24
Kingston upon Hull	http://hullcc-consult.limehouse.co.uk/portal/planning/amr/annual_monitoring_report_2009?pointId=625831	AMR 2008/2009	to 25/26
Kirklees MBC	http://www.kirklees.gov.uk/business/planning/LDF/pdf/AMR2009-10final.pdf	Dec-10	to 27/28
Leeds Council	http://www.leeds.gov.uk/files/Internet2007/2009/52/leeds%20ldf%20amr%202009%20updated%20for%20publication.pdf	AMR 2008/2009	to 25/26
North East Lincolnshire BC	http://www.nelincs.gov.uk/GetAsset.aspx?id=fAA0ADkAMAA0AHwAfABUAHIAdQBlAHwAfAAwAHwA0	Dec-10	to 26/26
North Lincolnshire Council	http://www.planning.northlincs.gov.uk/PlanningReports/AMR/AMR2009.pdf	Dec-09	2025/26

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North York Moors NP	http://www.northyorkmoors.org.uk/uploads/publication/10161.pdf	Dec-09	No projection
Richmondshire DC	http://www.richmondshire.gov.uk/planning/planning-policy/local-development-framework/annualmonitoringreport.aspx	2009	See note.
Rotherham MBC	http://www.rotherham.gov.uk/downloads/file/4386/annual_monitoring_report_2010	Dec-10	2025/26
Ryedale DC	http://extranet.ryedale.gov.uk/PDF/Ryedale%20AMR%202009.pdf	Dec-09	2020/21
Scarborough BC	http://www.scarborough.gov.uk/pdf/AMR%202010%20FINAL_test.pdf	Dec-10	2003-2023
Selby DC	http://www.selby.gov.uk/upload/FINAL_DRAFT_AMR_2009-10.pdf	09/10	2001-2025
Sheffield Council	http://www.sheffield.gov.uk/planning-and-city-development/planning-documents/sdf/sdf-annual-monitoring-report	Dec-09	2004-2025
Wakefield MDC	http://www.wakefield.gov.uk/NR/rdonlyres/77726D30-0EB3-4703-9672-71EFBFFFBF41/0/LDF_AnnualMonitoringReport2010.pdf	Dec-10	2002-2025
York Council	http://www.york.gov.uk/content/45053/64877/64880/Local_development_framework/200809AMR	Dec-09	2003-2014
Amber Valley BC	http://www.ambervalley.gov.uk/NR/rdonlyres/CEDA8A07-5FAA-4577-B846-F658E6754542/0/AMR20092010.pdf	Dec-10	2009/10 - 2025/6
Ashfield DC	http://www.ashfield-dc.gov.uk/ccm/cms-service/stream/asset/?asset_id=12689038&	Dec-10	2009/10 - 2025/6
Bassetlaw DC	http://www.bassetlaw.gov.uk/pdf/Final%20AMR%202009.pdf	Dec-09	to 2014/15
Blaby DC	http://idocs.blaby.gov.uk/external/planning-building/planning/annual-monitoring-report-2009.pdf	Dec-09	to 2025/6
Bolsover DC	http://www.bolsover.gov.uk/images/pdfs/Planning_Policy/Annual_Monitoring_Report/submission_version_5th_%20amr.pdf	Dec-09	to 2025/6
Boston BC	http://www.boston.gov.uk/index2.php?option=com_docman&task=doc_view&gid=2018&Itemid=3276	09/10	9/10 - 15/16
Broxtowe BC	http://www.broxtowe.gov.uk/CHttpHandler.ashx?id=20468&p=0	Dec-10	
Charnwood BC	http://www.charnwood.gov.uk/files/documents/annual_monitoring_report_2009_2010/ANNUAL%20MONITORING%20REPORT%202009-10.pdf	Dec-10	
Chesterfield BC	http://www.chesterfield.gov.uk/Site/1/Documents/Environment/Local%20Development%20Framework/Annual%20Monitoring%20Report/AMR6%20Submission%20document.pdf	Dec-10	
Corby	http://www.nnjpu.org.uk/docs/AMR%202009-10%20-%20Final.pdf	Dec-10	to 20/21
Daventry	http://www.northampton.gov.uk/downloads/AMR2010.pdf	Dec-10	to 25/26
Derby Council	http://www.derby.gov.uk/NR/rdonlyres/61F3B8C0-2A0F-42CD-9830-5341BF4C34D9/0/AMR_2010.pdf	Dec-10	to 25/26
Derbyshire Dales DC	http://www.derbyshiredales.gov.uk/Images/Derbyshire%20Dales%20District%20Counc3_tcm19-155488.pdf	Dec-10	to 25/26
East Lindsey DC	http://www.e-lindsey.gov.uk/NR/rdonlyres/022A9506-D73C-4253-8836-E79E7E761D9A/0/AnnualMonitoringReport2009.pdf	AMR 2008/2009	to 15/16
East Northamptonshire	http://www.nnjpu.org.uk/docs/AMR%202009-10%20-%20Final.pdf	Dec-10	to 20/21
Erewash BC	http://www.erewashcouncil.com/ldf/files/EBC%20AMR6%20(2009-10).pdf	Dec-10	2001-2025
Gedling BC	http://www.gedling.gov.uk/amr_2009-10.pdf	Dec-10	
Harborough DC	http://www.harborough.gov.uk/downloads/AMR_2010_LDS_Update_-_electronic_version.pdf	Dec-10	to 25/26

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High Peak BC	http://www.highpeak.gov.uk/planning/localframework/monitoringreport_2008-2009.pdf	AMR 2008/2009	to 25/26
Hinckley and Bosworth BC	http://www.hinckley-bosworth.gov.uk/downloads/file/1729/annual_monitoring_report_2009-10	Dec-10	to 25/26
Kettering BC	http://www.nnjpu.org.uk/docs/AMR%202009-10%20-%20Final.pdf	Dec-10	to 20/21
Leicester Council	http://www.leicester.gov.uk/EasySiteWeb/getresource.axd?AssetID=72305&type=full&servicetype=Attachment	Dec-10	to 25/26
Lincoln Council	http://www.ourcityourfuture.co.uk/doclib/State_Of_City_Report_Final_2009.pdf	AMR 2008/2009	to 25/26
Mansfield DC	http://www.mansfield.gov.uk/CHttpHandler.ashx?id=2846&p=0	AMR 2008/2009	to 25/26
Melton BC	http://www.melton.gov.uk/pdf/Melton%20AMR%202010%20FINAL.pdf	Dec-10	to 25/26
Newark and Sherwood DC	http://www.newark-sherwooddc.gov.uk/ppimageupload/holding/Image97790.PDF	Dec-10	to 25/26
North East Derbyshire DC	http://www.ne-derbyshire.gov.uk/Easysite/admin/AssetManager_ServeAsset.asp	AMR 2008/2009	to 25/26
North Kesteven	http://www.n-kesteven.gov.uk/upload/public/attachments/1323/Annual_Monitoring_Report_2010.pdf	Dec-10	to 25/26
North West Leicestershire DC	http://www.nwleics.gov.uk/files/documents/annual_monitoring_report_2010/Annual%20Monitoring%20Report%202010.pdf	Dec-10	to 25/26
Northampton BC	http://www.northampton.gov.uk/downloads/AMR2010.pdf	Dec-10	to 25/26
Nottingham Council	http://www.nottinghamcity.gov.uk/CHttpHandler.ashx?id=23517&p=0	Dec-10	to 25/26
Oadby and Wigston BC	http://www.oadby-wigston.gov.uk/Home/Planning/Forward%20Plans/Local%20Development/AMR%2008-09%20Full.pdf	AMR 2008/2009	to 25/26
Peak NP	http://old.peakdistrict.gov.uk/ldfamr2008-09.pdf	08/09	2001-2023
Rushcliffe BC	http://www.rushcliffe.gov.uk/upload/public/attachments/287/Appendix_4_Trajectory_Figures_AMR_2010.pdf	Dec-10	to 25/26
Rutland UA	http://www.rutland.gov.uk/ppimageupload/Image97402.PDF	Dec-10	to 25/26
South Derbyshire DC	http://www.south-derbys.gov.uk/Images/2010%20AMR_tcm21-152905.pdf	Dec-10	to 25/26
South Holland DC	http://www.sholland.gov.uk/NR/rdonlyres/0E757839-3023-4690-9C33-A2B947ECD268/0/AMR20092010.pdf	Dec-10	to 25/26
South Kesteven DC	http://www.southkesteven.gov.uk/CHttpHandler.ashx?id=4537&p=0	Dec-10	to 25/26
South Northamptonshire	http://www.northampton.gov.uk/downloads/AMR2010.pdf	Dec-10	to 25/26
Wellingborough	http://www.nnjpu.org.uk/docs/AMR%202009-10%20-%20Final.pdf	Dec-10	to 20/21
West Lindsey	http://www.west-lindsey.gov.uk/upload/public/attachments/1170/West_Lindsey_District_Council_2009_AMR.pdf	AMR 2008/2009	no Projection

Planning documents for Wales

Local Planning Authority	*Website*	*Document Date*	*Projection years*
Isle of Anglesey	http://www.anglesey.gov.uk/upload/public/attachments/50/Vision_and_Main_Options.pdf http://www.anglesey.gov.uk/upload/public/attachments/76/Chapter_16_Housing.pdf	2006	2010-2016
Blaenau Gwent	http://www.blaenau-gwent.gov.uk/documents/Documents_Environment/LDP_Draft_Preferred_Strategy.pdf	2008	2006-2021
Bridgend	http://www.bridgend.gov.uk/web/groups/public/documents/report/057945.pdf http://www.bridgend.gov.uk/BCBCUDP/english/text/text04.htm	2005	2001-2016
Caerphilly	http://www.caerphilly.gov.uk/pdf/Environment_Planning/LDP/written-statement.pdf	Nov-10	2006-2021
Cardiff	http://www.cardiff.gov.uk/objview.asp?object_id=16560 http://www.cardiff.gov.uk/ObjView.asp?Object_ID=3844	2007	2006-2016
Carmarthenshire	http://www.cartoplus.co.uk/carmarthenshire/english/text/04_h_housing.htm	2006	2001-2016
Ceredigion	http://www.ceredigion.gov.uk/utilities/action/act_download.cfm?mediaid=23626	Dec-10	2007-2022
Conwy	http://www.conwy.gov.uk/upload/public/attachments/378/Conwy_Deposit_LDP_ENGLISH.pdf	2009/2010	2007-2022
Denbighshire	http://denbighddms.wisshost.net/webfiles/Deposit/LDP%20final%20version%2023%20sep%20English%20low%20res.pdf	2009	2001-2022
Flintshire	http://www.flintshire.gov.uk/wps/wcm/connect/8c493800497bc02b8068bfbfb73e2b74/UDP_DPPReport_Housing_Requirement.pdf?MOD=AJPERES	2003	2001-2015
Gwynedd	http://www.cartogold.co.uk/gwynedd/text/english/05_social.html#h	Jul-09	2001-2016
Merthyr Tydfil	http://www.merthyr.gov.uk/NR/rdonlyres/04502615-243F-4432-BBA5-0B8F4A472DCB/0/WrittenStatement.pdf	2008	2006-2021
Monmouthshire	http://www.monmouthshire.gov.uk/downloads/Preferred_Strategy_Complete.pdf http://www.monmouthshire.gov.uk/downloads/Part_II.pdf	2006	2001-2021
Neath Port Talbot	http://www.npt.gov.uk/PDF/udp_adopted_text.pdf	2008	2001-2016
Newport	http://www.newport.gov.uk/stellent/groups/public/documents/plans_and_strategies/cont063489.pdf	2006	2001-2011
Pembrokeshire	http://www.pembrokeshire.gov.uk/objview.asp?object_id=5577&language= http://www.pembrokeshire.gov.uk/content.asp?nav=109%2C141%2C142&parent_directory_id=646	2006	2001-2021
Powys	http://www.powys.gov.uk/uploads/media/Written_statement_final_web_en_04.pdf	Mar-10	2001-2016
Rhondda, Cynon, Taff	http://www.rhondda-cynon-taf.gov.uk/en/relateddocuments/publications/developmentplanning/localdevelopmentplan2006-2021/depositdraftlocaldevelopmentplan.pdf	2009	2006-2021
Swansea	http://www.swansea.gov.uk/media/pdf/8/5/UDP_Written_Statement_Final_Version.pdf	Nov-08	2001-2016
Torfaen	http://test.torfaen.contensis.co.uk/EnvironmentAndPlanning/Planning/ForwardPlanning/Publications/PreferredStrategy.pdf	2008	2006-2021
The Vale of Glamorgan	http://www.valeofglamorgan.gov.uk/files/Living/Planning/Policy/UDP/UDP.pdf	2007	2001-2026
Wrexham	http://www.wrexham.gov.uk/assets/pdfs/planning/udp/written_statement_e.pdf http://www.wrexham.gov.uk/assets/pdfs/planning/ldp/deposit_documents/reports/ldp_written_statement_deposit.pdf	2005	2001-2021

Appendix D Demographic Parameters

SUMMARY

There are several sets of assumptions that are required in the operation of the Scenario Generator in addition to the base and forecast year inputs. These affect the way in which population, households and employment are allocated to zones in forecast years.

The following base year parameters are required by the Scenario Generator:

- Minimum number of average adults per household
- Maximum number of average adults per household
- Weighting of population trends versus dwellings policy in allocation of households (1=fully dwellings-led, 0=fully population-led, 0.5=evenly weighted)
- Maximum acceptable difference between households and dwellings
- Number of one person households suppressed per 2+ person households created
- Maximum allowable increase in occupancy rate
- Minimum allowable vacancy rate
- Maximum allowable rate of decrease in vacancy rate
- Proportion of population in communal establishments (by age and gender for the study area)
- Ratio of jobs to workers (by sector, gender and working status for the study area)
- Expected number of people in each household type (by type, gender and life stage in each district control area)

In addition, the following forecast parameters are required by the Scenario Generator:

- Proportion of workers by gender and working status that are in each life stage
- Proportion of excess households that relocate to other control areas where capacity is exceeded
- Minimum acceptable employment rate by gender and age group
- Maximum acceptable employment rate by gender and age group
- Maximum acceptable change in employment rate by gender, age and working status

BASE YEAR PARAMETERS

Types of persons in households (π)

This parameter is required for each district control area to split the number of persons by age and gender into household types (one person or two or more person households). The data sources for the derivation of these parameters are:

Table D.1 Data sources for calculating parameter pi

Data source	Spatial scale	Description of use
Census Table ST004	District, Unitary Authority	Count of people, by gender and age-group
Census Table UV051	District, Unitary Authority	Count of households, occupied by 1-person and 2+people
2001 SAR	Region	Proportion of people in each household type, gender and age group

The Census data gives the total number of people in each type of household for each control area and a cross-tabulation of gender against age group. This data is factored up to mid-year level estimates to counter under-enumeration issues. This provides a consistent control total for At region level, the 2001 SAR gives the number of sampled individuals in each cross-category of gender/age/household size. The proportions from the 2001 SAR are applied to the Census data down to the district level. These are controlled to the Census totals in order to keep a consistent average household size.

Household/ Dwelling differential (ψ)

This parameter sets a maximum limit on the difference between the number of households and the number of dwellings, ie how many more dwellings than households there may be. This is at the Region level and offers a check that the data is not orders of magnitude from expected values. Figure D.1 shows the difference in these ratios in 2001 for each region, taken from 2001 Census data. A value of 0.1 was assigned to this parameter.

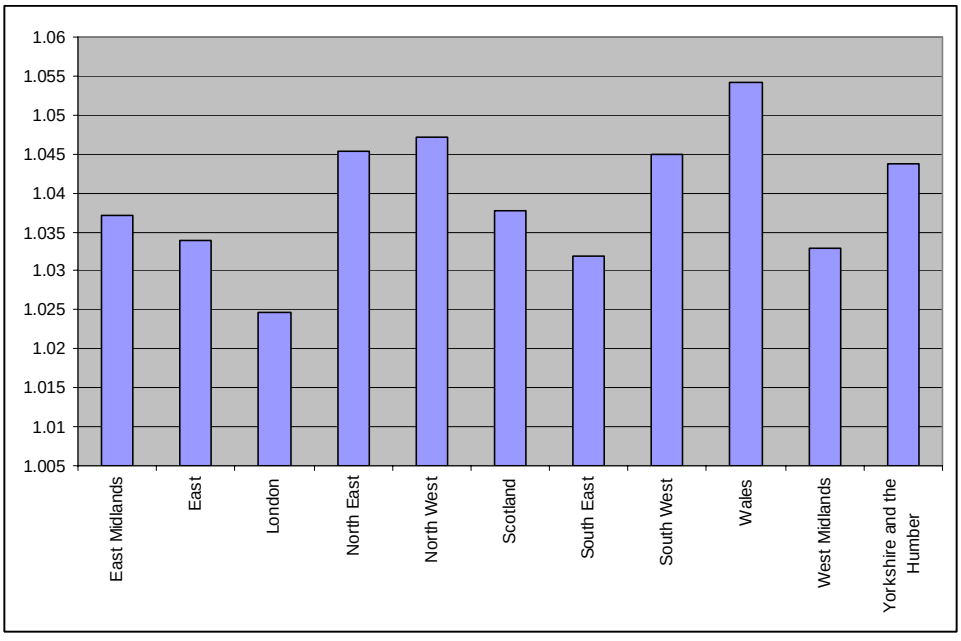


Figure D.1 Ratio of dwellings to households in each region, Source: 2001 Census

Minimum number of adults in households (β_{min})

Although theoretically there are a very small number of zero-adult households in the Census, this value can be assumed to be 1.

Maximum number of adults in households (β_{max})

Figure D.2 shows that the average number of adults in each region varies between 1.75 and just over 1.9. The β_{max} variable required is for the regional level. Bearing in mind the trend towards 1 person households, it is doubtful that this will ever go over an average of two persons per household in any region. However, to cover the possibility of this being the case when back-casting, this may exceed 2. For instance, Wales had approximately 2.03 adults per household in 1991. Therefore β_{max} should be set to 3 to catch any serious data problem that may occur when generating a scenario.

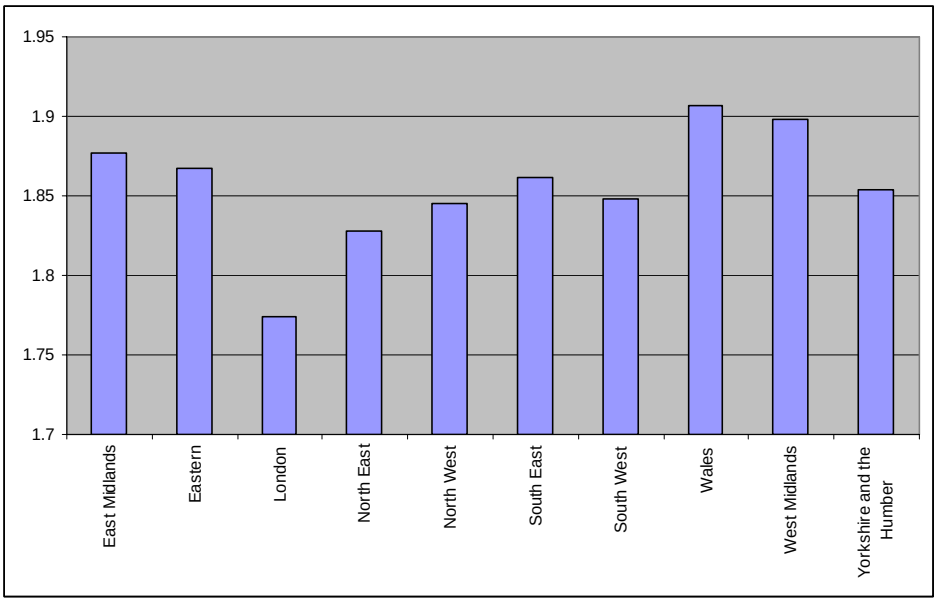


Figure D.2 Average number of adults per households, Source: 2001 Census

Occupancy rate (θ)

Occupancy rate is the number of households that occupy household spaces (ie dwellings). There are rare circumstances where more than one household can inhabit a dwelling. A set of occupancy rates is required for each district control area. This is derived from households from Census Table UV51 and dwellings from Census Table UV55.

Communal residents (α)

The proportion of communal residents in the population by gender and age group is required. The DCLG data set of population projections contains household population estimates for 1991-2021, whilst the GAD data set contains total population estimates for 2003-2043. By subtracting one from the other for the overlap period of 2003-2021, the estimated communal populations are derived, as shown in Table D.2. Apart from an absolute dip from 2003-2006, this shows a solid rise from 1.4% to 4.2% (2006-21).

Table D.2 Total, household, and inferred communal population of England, 2003-2021.

Year	Total population (K)	Household population (K)	Inferred communal population (K)	Household population as % of total	Inferred communal population as % of total
2003	48,966	49,856	890	98.22%	1.78%
2006	49,783	50,483	700	98.61%	1.39%
2011	50,413	51,595	1,182	97.71%	2.29%
2016	51,076	52,770	1,694	96.79%	3.21%
2021	51,704	53,954	2,250	95.83%	4.17%

The input populations to the forecasts have the communal residents removed during the Scenario Generator process, as it is the household population that is used.

The proportion of communal residents in each Region, gender and age group are taken from the 2001 Census. The proportions used for each nominated age group can be seen in Table D.3 and Table D.4. It is these figures that are input as the communal residents' parameters. Older age groups are broken down into more detail since this group contains the majority of communal residents, as can be seen in Figure D.3. This chart also shows a major difference between the 1991 and 2001 Census in the treatment of students living in halls of residence. These are now enumerated in the 2001 Census as communal residents in their area of study whereas in 1991 they were enumerated at the parental home.

Table D.3 Proportion of male population that is resident in communal establishments, by region and age group.

Grouped ages and regions	North East	North West	Yorks & Humber	East Midlands	West Midlands	*London + SE + EE*	South West
0 to 14	*0%*	*0%*	*0%*	*0%*	*0%*	*1%*	*1%*
15 to 29	*4%*	*4%*	*4%*	*5%*	*4%*	*5%*	*6%*
30 to 64	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
65 to 69	1%	1%	1%	1%	1%	*1%*	1%
70 to 74	2%	2%	1%	1%	1%	*1%*	1%
75 to 79	3%	3%	3%	2%	2%	*2%*	2%
80 to 84	6%	5%	5%	4%	4%	*4%*	4%
85 to 89	12%	11%	11%	10%	9%	*8%*	10%
90 to 94	23%	20%	19%	20%	17%	*16%*	21%
95 +	*27%*	*27%*	*28%*	*28%*	*23%*	*24%*	*34%*

Table D.4 Proportion of female population that is resident in communal establishments, by region and age group.

Grouped ages and regions	North East	North West	Yorks & Humber	East Midlands	West Midlands	*London + SE + EE*	South West
0 to 14	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*1%*
15 to 29	*3%*	*3%*	*3%*	*3%*	*3%*	*3%*	*4%*
30 to 64	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*	*1%*
65 to 69	1%	1%	1%	1%	1%	*1%*	1%
70 to 74	2%	2%	1%	1%	1%	*1%*	1%
75 to 79	4%	4%	4%	4%	3%	*3%*	3%
80 to 84	9%	9%	8%	8%	7%	*7%*	8%
85 to 89	19%	18%	18%	18%	16%	*15%*	18%
90 to 94	34%	34%	33%	34%	29%	*28%*	34%
95 +	*48%*	*49%*	*49%*	*49%*	*44%*	*43%*	*51%*

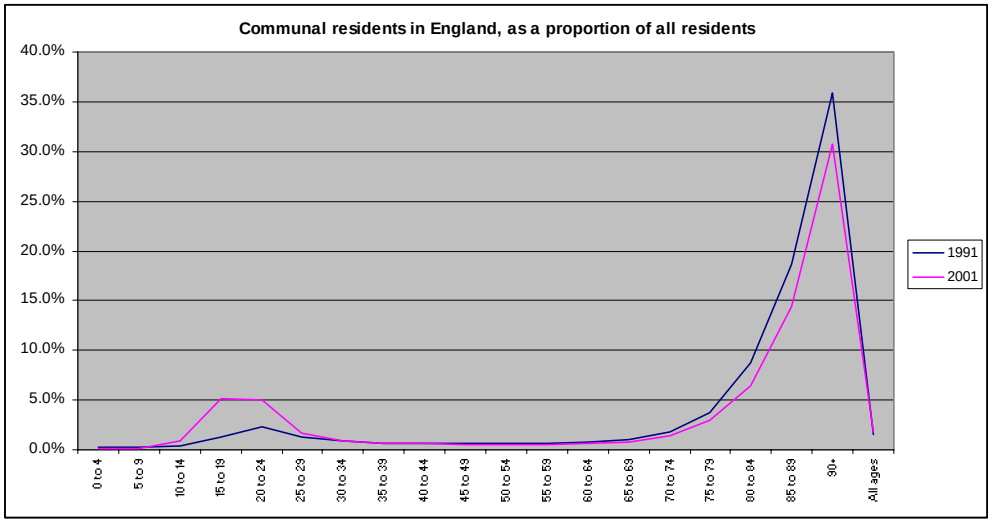


Figure D.3 Comparison of recorded communal residency in 1991 and 2001.

Dwelling vacancy levels (v)

Census Table CAS048 splits the dwellings into occupied and unoccupied for the 2001 base year, with unoccupied further subdivided into second homes (including holiday accommodation) and into vacant dwellings.

Dwellings not used as main residence (S)

In the previous version of TEMPRO, the information required for this parameter was the number / proportion of dwellings that are not used as the main residence, i.e. used as a holiday home, student accommodation, or second homes. A change will be realised in TEMPRO v5 due to the different method recording of students between the 1991 and 2001 Censuses. In the 1991 Census, students are treated as being usually resident at their main residence, ie their parental address. In 2001, students are treated as being usually resident at their term-time address. This effectively decreases the apparent amount of student accommodation as second homes and increases the number of student communal residents where living in halls of residence.

Census Table CAS048 provides the number of usually unoccupied dwellings, separated into second and holidays homes or vacant dwellings.

Ratio of workers to jobs (γ)

This parameter is responsible for converting jobs to workers. This is primarily due to the fact that workers are not constrained to having one job and occasionally have second jobs, intuitively more often in the case of part time workers. This parameter is also used in the preparation of the base year data where jobs are required as input rather than workers derived from the Census. A set of these parameters are required by employment sector, gender and work type (full time/ part time) for each Region.

Jobs to workers are calculated using the 2001 EBS LA level dataset. This is by gender, work type and EBS employment type and hence requires a match-up with the NTEM employment types. The parameter required by the Scenario Generator is also required by work type, ie full time or part time jobs. In the absence of satisfactory data, it was estimated that 95% of those with second jobs will be part time workers, leaving 5% of full time workers having second jobs.

FORECAST YEAR PARAMETERS

Minimum and maximum acceptable employment rate and change in employment rate over time (σ_{min}, σ_{max}, $\hat{\sigma}$)

This parameter is used in the Scenario Generator to check that the employment rate lies within a certain threshold. Where this threshold is breached, the program stops generating the scenario. This prevents the model from falling outside acceptable levels. The parameters are set for each gender and working age group.

The ONS definition of employment rate is "…the proportion of the working-age population who are in employment". The working age population comprises men aged 16-64 and women aged 16-59. The LFS definition of employment is anyone who does at least one hour's paid work in the week prior to their LFS interview, or has a job that they are temporarily away from. Also included are people who do unpaid work in a family business and people on Government-supported training schemes.

The previous maximum employment rate in TEMPRO 4.2 was 85%, citing Berkshire as having the highest rate of around this total, while the national average struggled to exceed 75%. A rate is required far in excess of the national average for those counties that have higher than average rates. Clearly in this case differentiation by gender and life stage is required as well. A similar method is employed to determine the new parameter values.

Analysis done comparing EBS data with ONS population projections over time suggests that males on average have higher rates of employment than females. Also, no one county control area should exceed a 90% employment rate. Table D.5 shows the parameters suggested for use in the Scenario Generator. It should be noted that these are input by time period, although these default values should be practical in all cases.

Table D.5 Suggested minimum and maximum employment rates for all forecast years

Gender	Age group	Minimum	Maximum
Female	16-29	50%	90%
Male	16-29	55%	90%
Female	30-64	55%	90%
Male	30-64	65%	90%

The maximum change in employment rate over a specified period is also required. A similar analysis of trends over time in the change in employment rate indicates that for a five year period, the maximum change in employment rate for any gender/ worker type category is less than 3% (for female part time workers between 2006 and 2001). For the Scenario Generator, a maximum change parameter of 5% has been input to cover all reasonable cases. Where this is breached the generator will stop, indicating unrealistic data issues.

Maximum allowable change in occupancy rate ($\Delta\theta_{max}$)

A factor is required to set the maximum rate at which this may change over the forecast period length. Indications from the 1991 to 2001 inter-Censal trend show that a value of 0.5% more than adequately caters for each case. It is not anticipated that this rate will differ significantly over time and therefore is fixed at this value.

Proportion of workers in each working age group (ρ)

This parameter determines the proportion within the working age groups (16-29 and 30-64) that are of each gender and worker type combination. This is required for each region. Worker type here is either full time or part time only.

The 2001 SAR allows cross tabulation of all the required fields to construct the parameter for each region. The 2001 Census only counts those that are employed below the age of 75 and above the age of 15. For information purposes workers in the 64-74 group have also been extracted from the 2001 SAR.

Table D.6 shows the proportion of workers expected in the working young and working old groups by gender for each Region. These values include those aged 65 or greater, entailing that the proportions do not sum to one.

Table D.6 Proportion of workers within each working age group by gender, work type and Region, 2001

	Full Time				Part Time			
	Female		Male		Female		Male	
Region	16-29	30-64	16-29	30-64	16-29	30-64	16-29	30-64
East Midlands	0.298	0.696	0.218	0.774	0.190	0.792	0.387	0.528
North East	0.294	0.701	0.215	0.778	0.208	0.778	0.417	0.538
North West	0.298	0.696	0.224	0.767	0.206	0.774	0.391	0.537
Scotland	0.290	0.703	0.226	0.765	0.227	0.754	0.450	0.473
South West	0.293	0.697	0.219	0.770	0.182	0.791	0.349	0.543
Wales	0.275	0.716	0.225	0.761	0.208	0.772	0.365	0.564
West Midlands	0.298	0.696	0.222	0.768	0.195	0.782	0.392	0.519
Wider South East	0.325	0.669	0.237	0.753	0.193	0.780	0.364	0.538
Yorkshire and the Humber	0.301	0.694	0.227	0.764	0.197	0.787	0.384	0.545

Over time the proportion of workers aged 65 or greater is expected to increase. This is due to an ageing population and the potential increase in retirement age in forecast years. Therefore the rho parameters are adjusted downwards slightly over time to reflect a slightly greater proportion of the workforce being outside of the designated working age of 16-64.

In NTEM 5.4, Rho parameters were revised in 2001 to exclude communal establishments from the population.

Proportion of excess households that relocate (λ)

Where household allocation within a control area exceeds housing supply, a proportion of those willing to live in that control area will be dispersed to other control areas with excess dwelling supply within that study area. This proportion is determined by this parameter and is specific to each forecast year. This value is set to 0.5, causing half of excess households to relocate to other districts where housing demand is unfulfilled in the target district. The remainder will be suppressed or in the case of one person households may coalesce to become multi-person households (see parameter μ).

Dwelling/ population policy-led development (ζ)

This parameter determines in forecast years how much the process of the allocation of households across control areas will follow the number of available dwellings or the projected trend in population. A global value of 0.75 is fixed presently, erring more towards policy based forecasts than past trends. This If this value is set to 1, this indicates total dependency on dwellings in relocating future households and zero represents a complete following of the population projections.

Suppressed single person households that convert to multiple person households (μ)

This is a global parameter that determines the number of one person suppressed households that are reformed as multi-person households. This occurs where households that wish to locate in a control area are not able to due to restricted dwelling supply. This models the real-world case where people elect to live with others or move into a parental home, etc, where they cannot find a suitable dwelling on their own.

This parameter is set to 3, indicating that every third single person household will convert to multi-person households.

Appendix E Mathematical Specification of Methodology

NOTATION / TERMINOLOGY

The main variables and their definitions are shown in Table E.1 which also identifies those variables which are new or differ in their definition from the MVA / DCS specification.

Table E.1 Quantity variables

Variable	Description
E	Employment (= jobs including the self employed)
H	Households
P	Population (people) living in households (ie excludes those living in communal establishments) $P = W + N$
$\hat{P}$	Total population (input) – includes those in communal establishments
W	Workers (working population) - full time/ part time - ***definition changed***
N	Non workers (ie students and others) – new variable
D	Dwellings - new variable
S	Household spaces - new variable

The subscripts attached to the variables denote the time and space applicable to the value while the superscripts denote categories / types of the variables. Forecasts will be for current year and scenario *t* for the period p starting from a previous year and scenario *t-1*.

Table E.2 Subscripts – time and place

Variable	Description
i	NTEM zone
c	Control area for forecasting tools - an aggregation of *i* for study area *R* at which the forecasts are controlled to exogenous projections. Existing tool c=county level Proposed tool c^H =district level for home / residential variables – all variables except E c^E =county level for employment / workplace variables E
B	Balancing Area, $i \in B$ (notation changed from MVA version)
R	Study area to be processed = Region in most cases equivalent to the term "Definition" in the existing tool.
t	Forecast scenario If forecast scenario is *t*, previous forecast scenario is *(t-1)*
p	Forecast period from scenario *(t-1)* to scenario t

Table E.3 Superscripts – categories / dimensions

Superscript	On var:	Category / dimension
a	*E*	Employment sector = trip attractor type as defined in Section 2.7
g	*P, W*	Gender (Male, Female, Both –children)
h	*H*	Modelled household types – 1 and 2+ **person** hholds
l	*P, W*	Modelled age bands (<16, 16 – 29, 30 – 64, 65+) (l for life stage)
m	*P*	Age (input bands / years) of input data (m $\in$ l)
w	*P, W, E*	Working status - *only relevant for 16-29 and 30-64 age groups* On P, w = F – full time, P – part time, S – students, O – other On W and E, w = F – full time or P – part time On N, w = S – students, O – other

Other notation / assumptions applied are:

n used to denote iteration n in an iterative procedure

^ used to identify user specified input data / parameters which may be internally adjusted during the forecasting process

~ used to denote intermediate values for variables / parameters

(1), (2) used in balancing process to denote many intermediate estimates of a variable

Final forecasts / estimates have no hieroglyphics.

For each of the main variables there are a set of type categories as follows:

- Employment by sector, gender and hours (full / part time), E_{ti}^{agw}
- Population by gender, age and working status, P_{ti}^{glw}
- Households by size, H_{ti}^{h}

PARAMTER DEFINITIONS

- α_R^{gm} the proportion of the population within a given gender and age group residing in communal establishments in study area (Region) *R*.
- β_{min}, β_{max} acceptable range for number of adults per household in study area
- $\hat{\beta}$ minimum number of persons allowed per 2+ person household
- ψ acceptable scale of difference in ratio of households to dwellings in study area (eg 0.25 means within ±25%)

- θ_c the occupancy rate (household spaces per dwelling) in control area *c* in 2001 starting year
- $\Delta\theta_{max}$ the maximum allowable increase in occupancy rate (households per dwelling) from the base / starting values
- υ_c the vacancy rate in control area *c* in 2001 starting year
- υ_{min} the minimum allowable vacancy rate
- χ the proportion of the vacancy rate from the previous scenario that the vacancy rate in the present scenario may fall to.
- S_c^Y the number of household spaces in the control area *c* otherwise occupied (ie not vacant and not occupied by households – eg holiday homes) in 2001 starting year
- ζ proportion of household location that is dwelling / policy led rather than based on population trends
- μ determines the number of one person (type 1) suppressed households that are reformed as multi person households (type 2)
- π_c^{hgl} is the expected number of persons of type *gl* in household type *h* in control area *c,* from 2001 Census (SARs plus standard tables).
- γ_R^{agw} ratio within employment sector *a* of workers of gender *g* and working status *w* = F or P, to jobs (w=S and O irrelevant here as they are non-workers).

POPULATION AND HOUSEHOLD TOTALS FOR STUDY AREA (REGION)

Initial estimate of total population is taken as:

$$\widetilde{P}_{tR}^{gl} = \sum_{c \in R} \widetilde{P}_{tc}^{gl} \quad \text{and} \quad \widetilde{P}_{tc}^{gl} = \sum_{m \in l} \hat{P}_{tc}^{gm} \left(1 - \alpha_R^{gm}\right) \text{and c} \in \text{R} \qquad \text{(Eq 1)}$$

where $\hat{P}_{tc}^{gm}$ is the input population by gender *g* and age *m* for the control area *c* of study area *R* in scenario *t*

α_R^{gm} is the assumed proportion of the population in age group m of gender g residing in communal establishments in study area *R.*

Initial estimate of total households is taken as:

$$\widetilde{H}_{tR} = \sum_h \hat{H}_{tR}^h \qquad \text{(Eq 2)}$$

JOBS AND WORKERS TOTALS FOR STUDY AREA (REGION)

A total number of jobs (employment) at the County (control area) level in each forecast year is provided as an input from the EBS data set. This information can be used to scale the jobs from the previous scenario which are then aggregated to give the study area totals.

$$\tilde{E}_{tc}^{agw} = E_{(t-1)c}\left(\frac{\hat{E}_{tc}}{\hat{E}_{(t-1)c}}\right)\frac{E_{(t-1)c}^{agw}\left(\frac{\hat{E}_{tc}^{agw}}{\max(\hat{E}_{(t-1)c}^{agw},0.001)}\right)}{\sum_{agw} E_{(t-1)c}^{agw}\left(\frac{\hat{E}_{tc}^{agw}}{\max(\hat{E}_{(t-1)c}^{agw},0.001)}\right)}$$

where $\hat{E}_{tc} = \sum_{agw}\hat{E}_{tc}^{agw}$ and $\tilde{E}_{tR}^{agw} = \sum_{c\in R}\tilde{E}_{tc}^{agw}$ (Eq 3)

A set of factors are derived to relate the employment measured in units of jobs to the population measured in units of persons in employment. This allows the derivation of the number of workers as follows:

$$W_{tR}^{glw} = \rho_{tR}^{glw}\sum_{a}\gamma_{R}^{agw}\tilde{E}_{tR}^{agw} \quad \text{(Eq 4)}$$

where $\tilde{E}_{tR}^{agw}$ is the initial estimate of employment by sector *a*, gender *g* and working status *w*, for the study area R in year t from Eq 3.

γ_{R}^{agw} is the assumed ratio of workers of gender g and working status *w* to jobs in employment sector *a* (stored parameter table that could be modified occasionally).

ρ_{tR}^{glw} is the proportion of workers by gender and working status who are in the working age groups

CONTROL TOTAL CHECKS

The relationship between the adult population and households is checked to ensure that the average number of adults (in this case aged 16+) per household is acceptable.

$$\beta_{min} \le \frac{\sum_{g,l\neq child}\tilde{P}_{tR}^{gl}}{\tilde{H}_{tR}} \le \beta_{max} \text{ where } \beta_{min} \ge 1 \text{ and } \beta_{max} > \beta_{min} \quad \text{(Eq 5a)}$$

With declining household sizes through time, a second check is prudent. This check calculates the average number of persons per 2+ person household for the study area as a whole.

$$\frac{\sum_{g,l}\tilde{P}_{tR}^{gl} - \hat{H}_{tR}^{h=1}}{\hat{H}_{tR}^{h=2}} \le \hat{\beta} \text{ where } \hat{\beta} \ge 2 \text{ (specified by user)} \quad \text{(Eq 5b)}$$

The workforce required to satisfy the employment forecasts should also be compared with the potential workers available from the population forecasts.

$$\sigma_{t,min}^{gl} \le \frac{\sum_{w} W_{tR}^{glw}}{\widetilde{P}_{tR}^{gl}} \le \sigma_{t,max}^{gl} \quad \text{where } 0 < \sigma_{t,min}^{gl} < \sigma_{t,max}^{gl} < 1 \qquad \text{(Eq 6)}$$

Ratio of workers to jobs: $\dfrac{\sum_{glw} W_{tR}^{glw}}{\sum_{agw} \widetilde{E}_{tR}^{agw}}$ (Eq 7)

The forecast number of households is checked to ensure that it will fit within the forecast development of dwellings.

$$S_{tR}^{\max} = \sum_{c \in R} D_{tc}\left(\theta_c + \Delta\theta_{\max}\right)\left[1 - \max\left(\upsilon_{\min}, \upsilon_{(t-1)c}\chi\right)\right] - \sum_{c \in R} S_c^Y \qquad \text{(Eq 8)}$$

where $\upsilon_{(t-1)c}$ is the vacancy rate obtained from the previous scenario and $\upsilon_{(t=0)c} = \upsilon_c$ input.

The ratio of household demand to the supply of space is checked against the bounds specified and the result output to the log file for the user to check.

$$\left|1 - \frac{\widetilde{H}_{tR}}{S_{tR}^{max}}\right| > \psi \qquad \text{(Eq 9)}$$

HOUSEHOLDS BY CONTROL AREA

The allocation of population and households to the control areas starts with trend based forecasts and then adjusts these to reflect the dwelling allocations provided by the regional planning bodies.

The first step is to disaggregate the study area household projections using input population forecasts for the control areas. This assumes the change in household size is uniform for all control areas within the study area, but that the starting pattern of household sizes is retained.

The previous total household estimates are scaled by the input change in population and controlled to the input Regional total.

$$H(1)_{tc} = \widetilde{H}_{tR} \frac{H_{(t-1)c} \sum_{gl} \widetilde{P}_{tc}^{gl} \Big/ \sum_{gl} P_{(t-1)c}^{gl}}{\sum_{c \in R} H_{(t-1)c} \sum_{gl} \widetilde{P}_{tc}^{gl} \Big/ \sum_{gl} P_{(t-1)c}^{gl}} \qquad \text{(Eq 10a)}$$

These households must then be split into those with one person (h=1) and those with two or more persons (h=2).

The input household size parameters for the 2+ person households (h=2) are first adjusted in each control area to reflect the input household forecasts by size. Those for 1 person households remain unchanged. Those for 2+ person households are scaled based on the change in input data. The lower bound of $\hat{\beta} \geq 2$ is also applied to the 2+ person household size parameters.

$$\pi_{tc}^{(h=1)gl} = \pi_{c}^{(h=1)gl}$$

$$\pi_{tc}^{(h=2)gl} = A_{tc}\pi_{c}^{(h=2)gl} \text{ and } \sum_{gl}\pi_{tc}^{(h=2)gl} \geq \hat{\beta}$$

The value of the adjustment factor A_{tc} is calculated iteratively with estimates of the number of 2+ person households (h=2) as follows:

$$A_{tc}^{n+1} = max\left(A_{tc}^{n}\frac{\sum_{c\in R} H(1)_{tc}^{(h=2)n}}{\hat{H}_{tR}^{h=2}}, \frac{\hat{\beta}}{\sum_{gl}\pi_{c}^{(h=2)gl}} \right) \text{ and } H(1)_{tc}^{(h=2)n} = \frac{\sum_{gl}\tilde{P}_{tc}^{gl} - H(1)_{tc}}{A_{tc}^{n}\left(\sum_{gl}\pi_{c}^{(h=2)gl} - 1\right)}$$

(Eq 10b)

The initial value for the scaling factor should be based on the change from the previous number of persons in an average 2+ person household to the new average number of persons in a 2+ person household. Again the lower bound should be applied. Thus:

starting with $A_{tc}^{1} = max\left(\frac{\left(\sum_{gl}\tilde{P}_{tR}^{gl} - \hat{H}_{tR}^{h=1}\right) \Big/ \hat{H}_{tR}^{h=2}}{\left(\sum_{i\in R}\sum_{glw} P_{(t-1)i}^{glw} - \sum_{i\in R} H_{(t-1)i}^{h=1}\right) \Big/ \sum_{i\in R} H_{(t-1)i}^{h=2}}, \frac{\hat{\beta}}{\sum_{gl}\pi_{c}^{(h=2)gl}} \right)$

where π_{c}^{hgl} is the expected number of persons of type *gl* in household type *h* in control area *c*

and $\hat{H}_{tR}^{h}$ is the number of households by type input by the user.

$H(1)_{tc}$ is the estimated total number of households in the control area as calculated by (Eq 10a)

This iterative process continues until $\left|\frac{A_i^{n+1}}{A_i^{n}} - 1\right| \leq 1\times10^{-5}$.

Once $H(1)_{tc}^{(h=2)}$ has been obtained from this iterative process, the number of 1 person households is obtained by subtraction:

$$H(1)_{tc}^{(h=1)} = H(1)_{tc} - H(1)_{tc}^{(h=2)} \quad \text{(Eq 10c)}$$

In reality the change in dwellings supply will affect the distribution of households. An allocation of households purely based on the change in dwellings would be:

If $\frac{\hat{H}^h_{tR} - H^h_{(t-1)R}}{\Delta D_{pR}} > 0$ (ie dwellings and households are forecast to move in the same direction) then:

$$H(2)^h_{tc} = H^h_{(t-1)c} + \left(\hat{H}^h_{tR} - H^h_{(t-1)R}\right)\frac{\Delta D_{pc}}{\Delta D_{pR}}$$

where $\Delta D_{pc} = D_{tc} - D_{(t-1)c}$ and $\Delta D_{pR} = \sum_{c \in R} \Delta D_{pc}$ (Eq 11)

otherwise $H(2)^h_{tc} = H^h_{(t-1)c} + \left(\hat{H}^h_{tR} - H^h_{(t-1)R}\right)\frac{H^h_{(t-1)c}}{H^h_{(t-1)R}}$

In practice the pattern of households is likely to be influenced by a mixture of trends and new developments so a combination of the above two approaches seems appropriate:

$$\tilde{H}^h_{tc} = (1-\zeta)H(1)^h_{tc} + \zeta H(2)^h_{tc} \quad \text{(Eq 12)}$$

In the absence of any data to determine the mix, the starting assumption is that $\zeta = 0.75$

Finally it is necessary to evaluate whether there is an implied excess household demand over the supply of space and then if appropriate to reallocate the household demand across the control areas within the study area or to suppress excess demand.

The number of household spaces using the initial vacancy rates and occupancy rates is:

$$S_{tc} = D_{tc}\theta_c\left(1-\upsilon_{c(t-1)}\right) - S^Y_c \quad \text{(Eq 13)}$$

The maximum number of household spaces available in each control area can be calculated (as seen for the study area in eq 8) as:

$$S^{\max}_{tc} = D_{tc}\left(\theta_c + \Delta\theta_{\max}\right)\left[1 - \max\left(\upsilon_{\min}, \upsilon_{c(t-1)}\chi\right)\right] - S^Y_c \quad \text{(Eq 14)}$$

where:

- the base year occupancy rate (=household spaces / dwellings) θ_c in control area *c* can change by a maximum amount $\Delta\theta_{max}$
- the vacancy rate obtained in the previous scenario $\upsilon_{c(t-1)}$ in control area *c* can decrease by a maximum proportion χ down to a lower bound υ_{min} (1%) and $\upsilon_{c0} = \upsilon_c$
- S^Y_c is the number of household spaces otherwise occupied (derived from the Census and taken as fixed)

The adjusted vacancy rate for the scenario (required for future dependent scenarios) is calculated as:

$$\upsilon_{ct} = \max\left(\upsilon_{\min}, \upsilon_{c(t-1)}\chi, \upsilon_{c(t-1)} - \left(\frac{H_{tc} - S_{tc}}{D_{tc}\theta_c}\right)\right) \quad \text{(Eq 15)}$$

where H_{tc} is output by Eq 20

The housing pressure is then calculated as:

$$HPressure_{tc} = \frac{\tilde{H}_{tc}}{S_{tc}^{max}} \quad \text{(Eq 16)}$$

If any control area in the study area has excess households, ie $\frac{\tilde{H}_{tc}}{S_{tc}^{max}} > 1$ for any *c*, then identify spare capacity and reallocate a proportion of the excess households between the control areas within the study area based on the capacity available

Excess households: $\tilde{X}_{tc} = max\left[\tilde{H}_{tc} - S_{tc}^{max}, 0\right]$ and $\tilde{X}_{tR} = \sum_{c \in R} \tilde{X}_{tc}$ (Eq 17)

Capacity available: $C_{tc} = max\left[S_{tc}^{max} - \tilde{H}_{tc}, 0\right]$ and $C_{tR} = \sum_{c \in R} C_{tc}$ (Eq 18)

The user may specify whether all excess households are prepared to relocate within the study area or whether only a proportion of them will move – in which case the remainder will be suppressed. If there is insufficient capacity even those identified as willing to relocate will be suppressed. On this basis the revised estimates of households in each control area would be:

Households by control area: $H_{tc} = \tilde{H}_{tc} - \tilde{X}_{tc} + \left(min\left(\lambda_t \tilde{X}_{tR}, C_{tR}\right)\right)\left(\frac{C_{tc}}{C_{tR}}\right)$ (Eq 19)

Where: λ_t is the proportion of households willing to move to other parts of the study area. When $\lambda_t < 1$, this will lead to a reduction in the number of households from that in the input data. Without an empirical basis for this proportion, initially assume that $\lambda_t = 0.5$ (ie 50%).

In practice we need to obtain revised household totals **by type** in each control area. Thus the types of household being suppressed and relocating need to be estimated.

It is likely that the inadequate space will impact differently on the different household types and as a result the suppression of households might be expected to alter the mix of household types in the study area. On this basis the updated household forecasts by household type for each control area are estimated as:

For household type 1:

$$H_{tc}^{h=1} = \tilde{H}_{tc}^{h=1} - \tilde{X}_{tc}\frac{\tilde{H}_{tc}^{h=1}}{\tilde{H}_{tc}}\left(\lambda_t + (1-\lambda_t)\left(\frac{\mu}{\mu - 1}\right)\right) + \left(min\left(\frac{C_{tR}}{\lambda_t \tilde{X}_{tR}}, 1\right)\sum_c \left(\lambda_t \tilde{X}_{tc}\frac{\tilde{H}_{tc}^{h=1}}{\tilde{H}_{tc}}\right)\right)\left(\frac{C_{tc}}{C_{tR}}\right)$$

And for household type 2:

$$H_{tc}^{h=2} = \tilde{H}_{tc}^{h=2} - \tilde{X}_{tc}\frac{\tilde{H}_{tc}^{h=2}}{\tilde{H}_{tc}} + (1-\lambda_t)\tilde{X}_{tc}\left(\frac{1}{\mu-1}\right)\frac{\tilde{H}_{tc}^{h=1}}{\tilde{H}_{tc}} + \left(\min\left(\frac{C_{tR}}{\lambda_t \tilde{X}_{tR}},1\right)\sum_c \lambda_t \tilde{X}_{tc}\frac{\tilde{H}_{tc}^{h=2}}{\tilde{H}_{tc}}\right)\left(\frac{C_{tc}}{C_{tR}}\right)$$

(Eq 20)

where $\tilde{H}_{tc}^{h}$ is the number of households from equation 12, and

μ determines the number suppressed households that are reformed as household type 2. If μ =4, then for every 4 single person households suppressed, 1 multi-person household is formed. Assume μ =4 initially as this is consistent with existing policy led forecasts.

This will work so long as $\frac{\tilde{X}_{tc}}{\tilde{H}_{tc}} \le \frac{\mu-1}{\mu-\lambda}$, otherwise more 1 person households will be suppressed than exist . In this exceptional case the program will terminate with an error.

The second term in the equations above is the proportion of the excess that is to be reallocated to other control areas with spare capacity. The third term is the remaining proportion of the excess that are suppressed by altering the household formation rates. The fourth term is the additional households being reallocated to the control area.

The following summary of adjustments made is recorded to the log file:

- Excess households identified:

$$\sum_{c\in R} X_{tc}^{h=1} = \sum_{c\in R}\left(\lambda_t \tilde{X}_{tc}\frac{\tilde{H}_{tc}^{h=1}}{\tilde{H}_{tc}}\right) + (1-\lambda_t)\left(\frac{\mu}{\mu-1}\right)\sum_{c\in R}\tilde{X}_{tc}\left(\frac{\tilde{H}_{tc}^{h=1}}{\tilde{H}_{tc}}\right) \text{ and.}$$

$$\sum_{c\in R} X_{tc}^{h=2} = \sum_{c\in R}\left(\tilde{X}_{tc}\frac{\tilde{H}_{tc}^{h=2}}{\tilde{H}_{tc}}\right) - (1-\lambda_t)\left(\frac{1}{\mu-1}\right)\sum_{c\in R}\tilde{X}_{tc}\left(\frac{\tilde{H}_{tc}^{h=1}}{\tilde{H}_{tc}}\right)$$

- Of which $\sum_{c\in R}\left(\tilde{H}_{tc}^{h=1} - H_{tc}^{h=1}\right)$ and $\sum_{c\in R}\left(\tilde{H}_{tc}^{h=2} - H_{tc}^{h=2}\right)$ were suppressed; and

- $\sum_{c\in R} X_{tc}^{h=1} - \sum_{c\in R}\left(\tilde{H}_{tc}^{h=1} - H_{tc}^{h=1}\right)$ and $\sum_{c\in R} X_{tc}^{h=2} - \sum_{c\in R}\left(\tilde{H}_{tc}^{h=2} - H_{tc}^{h=2}\right)$ were reallocated.

POPULATION BY CONTROL AREA

The trend based forecast population is an input for each control area defined. The household forecasts are adjusted to take account of these population trends, (optionally) the expected change in dwellings and to alleviate housing pressure. Since there is some reallocation of households amongst the control areas within the study area, then there should be an associated reallocation of population.

The input trend based population control totals are adjusted to reflect the household adjustment. An estimate of the number of people by type in each control area to be

reallocated is calculated from the initial trend based household estimate $H(1)^h_{tc}$ and the final household figures H^h_{tc} by type – taking into account how the household reallocation is converted into persons.

The input household size parameters for the 2+ person households (h=2) were previously adjusted in each control area to reflect the household forecasts (Eq 10b). Those for 1 person households remain unchanged.

We know the number of households which are moved when converting from a trend to a policy based forecast and we know those who move out of crowded control areas. So by applying the updated persons per household, the population moving out is:

$$H^{h^-}_{tc} = \left[max\left(H(1)^h_{tc} - \tilde{H}^h_{tc}, 0\right) + \left(\lambda_t \tilde{X}_{tc} \frac{\tilde{H}^h_{tc}}{\tilde{H}_{tc}} \right) \cdot min\left(\frac{C_{tR}}{\lambda_t \tilde{X}_{tR}}, 1 \right) \right] \text{ and } H^{h^-}_{tR} = \sum_c H^{h^-}_{tc}$$

$$P^{hgl^-}_{tc} = \pi^{hgl}_{tc} H^{h-}_{tc} \text{ and } P^{hgl^-}_{tR} = \sum_c P^{hgl^-}_{tc}$$

The significant variations in persons per household between alternative control areas within the study area (Region) should be taken into account when revising the population forecasts. The average household size for those **moving** within the study area (Region) is:

$$\Pi^{hgl}_{tR} = P^{hgl^-}_{tR} \Big/ H^{h^-}_{tR}$$

The population moving into control areas is thus:

$$P^{hgl^+}_{tc} = \Pi^{hgl}_{tR} \left(max\left(\tilde{H}^h_{tc} - H(1)^h_{tc}, 0\right) + min\left(\frac{C_{tR}}{\lambda_t \tilde{X}_{tR}}, 1 \right) \sum_c \lambda_t \tilde{X}_{tc} \frac{\tilde{H}^h_{tc}}{\tilde{H}_{tc}} \right) \left(\frac{C_{tc}}{C_{tR}} \right)$$

Having accounted for the changing household size to determine the number of people moving into and out of each control area, the trend based population forecasts can be adjusted as:

$$P^{gl}_{tc} = \tilde{P}^{gl}_{tc} - \sum_h P^{hgl^-}_{tc} + \sum_h P^{hgl^+}_{tc} \qquad \text{(Eq 21)}$$

PROCESSING GROWTH FACTORS

The revised approach provides the user with ***two options***:

- Weights based factoring – where all input EGFs must be of the same sign. The adjustment is then applied multiplicatively to ensure the control totals are met. Thus the relative difference between the input EGFs is retained.
- Trend based adjustments- where the input EGFs can be of mixed signs to reflect growth and decline. In this case the absolute difference between the EGFs is retained.

Adjustment to input EGFs for Weights based approach

This works in a similar way to previous version of TEMPRO. An initial adjustment is made to the growth factors to achieve the required control area changes (note that for employment the totals are for each sector a – summed over gender and working status groups gw). The adjusted growth factors would be calculated as:

$$g^a_{pi} = \frac{max\left(\hat{g}^a_{pi}\Delta\tilde{E}^a_{pc},0\right)}{\sum_{i\in c} min\left(\hat{g}^a_{pi}E^a_{(t-1)i},0\right)} \text{ if } \Delta\tilde{E}^a_{pc} \le 0$$

and $$g^a_{pi} = \frac{max\left(\hat{g}^a_{pi}\Delta\tilde{E}^a_{pc},0\right)}{\sum_{i\in c} max\left(\hat{g}^a_{pi}E^a_{(t-1)i},0\right)} \text{ if } \Delta\tilde{E}^a_{pc} > 0$$

where $$\Delta\tilde{E}^a_{pc} = \sum_{gw}\tilde{E}^{agw}_{tc} - \sum_{i\in c}E^a_{(t-1)i}$$

(in fact the ~ is redundant since $E^a_{tc} = \tilde{E}^a_{tc}$ as it is only the gw split that is adjusted).

A further adjustment is then required at the time of application if any of the adjusted growth factors within the control area is less than -1.

For households the equivalent equations are:

$$g^H_{pi} = \frac{max\left(\hat{g}^H_{pi}\Delta H_{pc},0\right)}{\sum_{i\in c} min\left(\hat{g}^H_{pi}H_{(t-1)i},0\right)} \text{ if } \Delta H_{pc} \le 0$$

and $$g^H_{pi} = \frac{max\left(\hat{g}^H_{pi}\Delta H_{pc},0\right)}{\sum_{i\in c} max\left(\hat{g}^H_{pi}H_{(t-1)i},0\right)} \text{ if } \Delta H_{pc} > 0$$

where $$\Delta H_{pc} = \sum_{h}H^h_{tc} - \sum_{h,i\in c}H^h_{(t-1)i}$$

Adjustment to input EGFs for Trend based approach

This approach maintains the absolute difference between the EGFs and adds a constant to each EGF to ensure the required control area change is required. There is no differential treatment for mixed sign EGFs or where the sign of the input EGFs is different to the control area change required. The only adjustment made is to prevent negative volumes of activity in any zone in scenario t.

In this case the adjusted growth factors are calculated as:

$$g^a_{pi} = \hat{g}^a_{pi} + \frac{\Delta E^a_{pc} - \sum_{i\in c}\hat{g}^a_{pi}E^a_{(t-1)i}}{\sum_{i\in c}E^a_{(t-1)i}}$$

For households the equivalent adjustment is:

$$g_{pi}^{H} = \hat{g}_{pi}^{H} + \frac{\Delta H_{pc} - \sum \hat{g}_{pi}^{H} H_{(t-1)i}}{\sum_{i \in c} H_{(t-1)i}}$$

POPULATION AND HOUSEHOLDS BY ZONE

The households in each control area are distributed to the zones within the control areas based on expected growth factors which are exogenously specified.

So $H_{ti} = H_{(t-1)i}\left(max\left(1+g_{pi}^{H},0\right)\right)$

However we require households **by type** in each zone which can be forecast as:

$$H_{ti}^{h} = H_{tc}^{h} \frac{H_{(t-1)i}^{h}\left(max\left(1+g_{pi}^{H},0\right)\right)A_i}{\sum_{i \in c} H_{(t-1)i}^{h}\left(max\left(1+g_{pi}^{H},0\right)\right)A_i} \quad \text{(Eq 22)}$$

Where the adjustment term A_i is required to ensure that the resulting number of households in each zone matches the number of households that would be obtained by applying the adjusted growth factors to the previous household total. This can be achieved *iteratively* (maximum of 100 iterations) as:

$$A_i^{n+1} = H_{(t-1)i} \Bigg/ \sum_{h}\left(\frac{H_{tc}^{h} H_{(t-1)i}^{h}}{\sum_{i \in c} H_{(t-1)i}^{h}\left(max\left(1+g_{pi}^{H},0\right)\right)A_i^{n}}\right)$$

until $\left|\frac{A_i^{n+1}}{A_i^{n}} - 1\right| \leq 0.01$ and where $A_i^{0} = 1$

A first zonal estimate of the population by gender and age is obtained by estimating the change in population by type from the change in households by type and then adding the expected change to the previous population. Note that the π_{tc}^{hgl} values used here are those obtained once the household forecasts have been determined.

$$\tilde{P}_{\mathrm{ti}}^{\mathrm{gl}} = \max\left(P_{(\mathrm{t\text{-}1})\mathrm{i}}^{\mathrm{gl}} + \sum_{h} \pi_{tc}^{hgl}\left(H_{ti}^{\mathrm{h}} - H_{(t-1)i}^{h}\right), 0\right) \quad \text{(Eq 23)}$$

The first estimate must then be adjusted to ensure the input control totals on population are met. Thus the population by zone is obtained as:

$$P_{ti}^{gl} = P_{tc}^{gl} \frac{\tilde{P}_{ti}^{gl}}{\sum_{i \in c} \tilde{P}_{ti}^{gl}} \text{ to ensure } \sum_{i \in c} P_{ti}^{gl} = P_{tc}^{gl} \quad \text{(Eq 24)}$$

The change in the zonal population from the previous scenario is:

$$\Delta P_{pi}^{gl} = P_{ti}^{gl} - P_{(t-1)i}^{gl} \quad \text{(Eq 25)}$$

The working status for the population within the zone is established as part of the balancing process for the demand for workers.

EMPLOYMENT AND WORKERS BY ZONE

The allocation of the employment from the control areas to the zones is carried out using two mechanisms:

- Following dwelling-led distribution of population
- Independent of changes in dwellings and population, following exogenous employment growth by sector

The allocation of the population led employment is carried out using the same zonal growth factors as the household information and is then adjusted to match the control totals for the employment sector. Thus zonal employment is initially calculated as:

$$E(1)_{ti}^{agw} = E_{(t-1)i}^{agw} \frac{H_{ti}}{H_{(t-1)i}} \quad \text{(Eq 26)}$$

A single scalar adjustment is then applied to ensure the control totals are met

$$\tilde{E}_{ti}^{agw} = \tilde{E}_{tc}^{agw} \frac{E(1)_{ti}^{agw}}{\sum_{i \in c} E(1)_{ti}^{agw}} \text{ so that } \sum_{i \in c} \tilde{E}_{ti}^{agw} = \tilde{E}_{tc}^{agw} \quad \text{(Eq 27)}$$

where $\tilde{E}_{tc}^{agw}$ is the initial employment data for the control area from Eq 3.

The input growth factors are adjusted to estimate the zonal employment as:

$$\tilde{E}_{ti}^{agw} = \tilde{E}_{tc}^{agw} \frac{E_{(t-1)i}^{agw} \left(max\left(1+g_{pi}^{a},0\right)\right)}{\sum_{i \in c} E_{(t-1)i}^{agw} \left(max\left(1+g_{pi}^{a},0\right)\right)} \quad \text{(Eq 28)}$$

BALANCE WORKFORCE AND WORKERS

The balancing process is concerned primarily with the “working age” population (ie *l* = 16-29 and 30-64 age groups). It is assumed that the proportion of the retired (aged 65+) population will not be of sufficient significance. The balancing process ensures that:

- there are the correct number of workers of different types living the in the balancing area for the jobs available; and
- the number of workers in each zone does not exceed a specified maximum proportion of the resident population.

The implied numbers of workers required in balancing area in the scenario given the employment forecast are:

$$\tilde{W}_{tB}^{glw} = \sum_{i \in B} \rho_{tR}^{lgw} \left(\sum_{a} \gamma_{R}^{agw} \tilde{E}_{ti}^{agw} \right) \text{ for w = F ,P} \qquad \text{(Eq 29)}$$

The change in the demand for workers from the previous scenario is:

$$\Delta \tilde{W}_{pB}^{glw} = \tilde{W}_{tB}^{glw} - W_{(t-1)B}^{glw} \text{ for w = F ,P} \qquad \text{(Eq 30)}$$

The changing employment profile through time should lead to a change in the gender profile of the workforce in each employment sector. The Scenario Generator includes an internal adjustment of the assumed gender and working status split by employment sector.

This internal adjustment process uses the following key concepts:

- Treating the previous population and the new population as two separate groups
- Treating declines before and completely independently to growth – logically they can only be applied to the "previous" population groups.
- Using "existing" profiles / employment rates from the previous scenario as an initial estimate of workers
- Calculating maximum possible numbers of workers by type
- Adjusting profile of workers demanded so no maxima are breached
- Determining how far it is necessary to move from the initial values towards the maximum values in order to satisfy the demand.

DECREASES IN POPULATION AND / OR WORKERS

The first stage is to account for any **decreases** in workers due to **decreases** in the population. This gives an intermediate population estimate:

$$\text{If } \Delta P_{pi}^{gl} < 0 \text{ then } P(1)_{ti}^{glw} = P_{(t-1)i}^{glw} + \Delta P_{pi}^{gl} \left(\frac{P_{(t-1)i}^{glw}}{P_{(t-1)i}^{gl}} \right) \text{ otherwise } P(1)_{ti}^{glw} = P_{(t-1)i}^{glw} \qquad \text{(Eq 31)}$$

$$\text{and} \qquad P(1)_{tB}^{glw} = \sum_{i \in B} P(1)_{ti}^{glw} \qquad \text{(Eq 32)}$$

The second stage is required only if either (FT, PT or both) of the required workforce categories *w* for the gender and age group *gl* in the scenario *t* is less than in the previous scenario *(t-1)*. In this case the number of workers of type *w* must be reduced while retaining the total forecast population numbers by zone (from Eq 31). This is achieved by simply scaling back the number of workers (by status) in each zone to match the control area total. The non workers are then increased by the same volume to retain the zonal population totals.

Thus if $\Delta W_{pB}^{w} < 0$ then :

$$P(2)_{ti}^{gl(w=F,P)} = P(1)_{ti}^{gl(w=F,P)} \frac{W_{tB}^{gl(w=F,P)}}{\sum_{i \in B} P(1)_{ti}^{gl(w=F,P)}} \text{ for w = F,P} \quad \text{(Eq 33)}$$

At this stage the total population by gender and age remains as above so that:

$$P(2)_{ti}^{gl} = P(1)_{ti}^{gl} = \sum_{w} P(1)_{ti}^{glw} \quad \text{(Eq 34a)}$$

with the non working population (not required at this stage) being the difference:

$$P(2)_{ti}^{gl(w=S,O)} = P(2)_{ti}^{gl} - \sum_{w=F,P} P(2)_{ti}^{gl(w=F,P)} \quad \text{(Eq 34b)}$$

This gives an intermediate forecast of population by working status $P(2)_{ti}^{glw}$ accounting for decreases in population and / or workers.

If $\Delta P_{pi}^{gl} \geq 0$ and $\Delta W_{pB}^{w} \geq 0$ then there are no decreases in population or workers. In this case the starting population data are the previous scenario results. To simplify notation for remaining balancing process, set $P(2)_{ti}^{glw} = P_{(t-1)i}^{glw}$.

INITIAL ESTIMATES OF WORKING STATUS PROFILE OF POPULATION IN EACH ZONE

For this part it is proposed to treat the population in two groups:

- The existing residents – from the previous scenario (year) with any declines already subtracted – a group for which the working status *w* is known: $P(2)_{ti}^{glw}$
- The change in population in period p (from (t-1) to t): $\Delta P_{pi}^{gl} = P_{ti}^{gl} - P_{(t-1)i}^{gl}$ for which the working status *w* has yet to be forecast.

An initial estimate of the population profile can be obtained by assuming the "new" population takes on the same profile as the existing population:

Thus $$\tilde{P}(3)_{ti}^{glw} = P(2)_{ti}^{glw} + \Delta P_{pi}^{gl} \left(\frac{P(2)_{ti}^{glw}}{P(2)_{ti}^{gl}} \right) \text{ for w= F, P} \quad \text{(Eq 35)}$$

If there is no existing population, the new population is split equally betwwn FT and PT workers.

The adjusted initial estimate of workers for zone and the balancing area is then calculated:

$$P(3)_{ti}^{glw} = \min\left(\tilde{P}(3)_{ti}^{glw}, P(4)_{ti,\max}^{glw} \right) \text{ for w= F, P}$$

$$P(3)_{tB}^{glw} = \sum_{i \in B} P(3)_{ti}^{glw} \text{ for w= F, P} \quad \text{(Eq 36)}$$

MAXIMUM SUPPLY OF WORKERS BY GENDER

For the new population the maximum rate is the specified ceiling rate. Thus:

Maximum employment rate for existing population in zone :

$$\sigma^{gl}_{ti,\max} = \min\left(\sum_{w} \left(\Delta\sigma^{glw}_{\max} + \sigma^{glw}_{(t-1)i} \right), \sigma^{gl}_{\max} \right) \quad \text{(Eq 37)}$$

Or $\sigma^{gl}_{ti,\max} = \left(\sigma^{gl}_{\max} \right)$ when there is no existing data

Giving a maximum supply of employees:

$$P(2)^{gl}_{ti,max} = \sigma^{gl}_{ti,max} P(2)^{gl}_{ti} \quad \text{(Eq 38)}$$

and a possible maximum for each working status type of:

$$\tilde{P}(2)^{glw}_{ti,max} = \left(\sigma^{glw}_{(t-1)i,} + \Delta\sigma^{glw}_{max} \right) P(2)^{gl}_{ti}$$

Although it may not be possible for both maxima by working status to be attained within the overall ceiling rate.

Ie it is possible that $P(2)^{gl}_{ti,max} = \sum_{w} \tilde{P}(2)^{glw}_{ti,max}$ or $P(2)^{gl}_{ti,max} \neq \sum_{w} \tilde{P}(2)^{glw}_{ti,max}$.

The two estimates $P(2)^{gl}_{ti,max}$ and $\tilde{P}(2)^{glw}_{ti,max}$ are used in separate stages of the remaining forecasting steps.

For the “new” population the maximum number of employees by gender is:

New population: $\Delta P(3)^{gl}_{pi,max} = \Delta P^{gl}_{pi} \sigma^{gl}_{t,max}$ (Eq 39)

Thus the maximum workers in zone: $P(3)^{gl}_{ti,max} = P(2)^{gl}_{ti,max} + \Delta P(3)^{gl}_{pi,max}$ (Eq 40)

Aggregating the results for all zones in the balancing area, gives a maximum number of male and female workers by age group:

Maximum workers by gender in balancing area:

$$P(3)^{gl}_{tB,max} = \sum_{i \in B} P(3)^{gl}_{ti,max} \quad \text{(Eq 41)}$$

The working status profile of the change in the demand for workers (ie the new demand) is used to split the potential workers in the “new population” into the two working status groups:

$$\Delta P(3)^{glw}_{pi,max} = \Delta P(3)^{gl}_{pi,max} \frac{max\left(\Delta W^{glw}_{pB}, 1\right)}{\sum_{w} max\left(\Delta W^{glw}_{pB}, 1\right)} \quad \text{(Eq 42)}$$

The maximum number of workers by gender and working status available in the population is then calculated as:

$$P(4)^{glw}_{ti,max} = \left(\tilde{P}(2)^{glw}_{ti,max} + \Delta P(3)^{glw}_{pi,max}\right) \text{ and } P(4)^{glw}_{tB,max} = \sum_{i \in B} P(4)^{glw}_{ti,max} \quad \text{(Eq 43)}$$

Since the estimates of the maximum full and part time workers may sum to more than the physical maximum a final adjustment is required.

To make this final adjustment the difference between the initial zonal estimates $P(3)^{glw}_{ti}$ and $P(4)^{glw}_{ti,max}$ are considered for the two cases w=F and w=P. For the working status with the smallest difference between the initial estimate and the initial maximum the maximum value is taken. For the other working status the maximum value is recalculated to ensure the overall employment rate is not breached. Thus:

If $\sum_{w} P(4)^{glw}_{ti,max} \le P(3)^{gl}_{ti,max}$, then $P(5)^{glw}_{ti,max} = P(4)^{glw}_{ti,max}$

Else: $P(5)^{gl(w=F)}_{ti,max} = P(4)^{gl(w=F)}_{ti,max}$ if

$$\left(P(4)^{gl(w=F)}_{ti,max} - P(3)^{gl(w=F)}_{ti}\right) < \left(P(4)^{gl(w=P)}_{ti,max} - P(3)^{gl(w=P)}_{ti}\right)$$

Else $P(5)^{gl(w=F)}_{ti,max} = P(3)^{gl}_{ti,max} - P(4)^{gl(w=P)}_{ti,max}$

and vice versa:

$P(5)^{gl(w=P)}_{ti,max} = P(4)^{gl(w=P)}_{ti,max}$ if

$$\left(P(4)^{gl(w=P)}_{ti,max} - P(3)^{gl(w=P)}_{ti}\right) < \left(P(4)^{gl(w=F)}_{ti,max} - P(3)^{gl(w=F)}_{ti}\right)$$

else $P(5)^{gl(w=P)}_{ti,max} = P(3)^{gl}_{ti,max} - P(4)^{gl(w=F)}_{ti,max}$

CHECKING / ADJUSTING THE GENDER PROFILE OF THE WORKERS DEMANDED

Excess workers are: $Z^{gl}_{tB} = \max\left(\tilde{W}^{gl}_{tB} - P(3)^{gl(w=F,P)}_{tB,\max}, 0\right)$ and $Z^{l}_{tB} = \sum_{g} Z^{gl}_{tB}$ (Eq 44)

Capacity for workers is: $Y^{gl}_{tB} = max\left(P(3)^{gl(w=F,P)}_{tB,max} - \tilde{W}^{gl}_{tB}, 0\right)$ (Eq 45)

If $Z^{l}_{tB} > Y^{gl}_{tB}$, then modifying the gender profile will not completely resolve any mismatch and in this case $Z^{l}_{tB} - Y^{gl}_{tB}$ workers are lost from the working age population – assumed to be filled by the over 65s and by increased double jobbing.

The final estimates of workforce by gender are:

$$W^{gl}_{tB} = \tilde{W}^{gl}_{tB} - Z^{gl}_{tB} + min\left(Y^{gl}_{tB}, Z^{l}_{tB}\right) \quad \text{(Eq 46)}$$

CHECKING / ADJUSTING THE FULL-TIME / PART-TIME SPLIT OF WORKERS

The next step is to finalise the working status of the population in the balancing area. To start, it is assumed that the working status profile of the modified demand is the same as for the initial demand. So the demand for workers by working status is:

$$W(1)_{tB}^{glw} = W_{tB}^{gl} \frac{\tilde{W}_{tB}^{glw}}{\tilde{W}_{tB}^{gl}} \quad \text{(Eq 47)}$$

By this stage it is ensured that the demand for male and female workers can be accommodated within the population supply. As before there is either an excess or capacity calculated as:

Excess workers are: $Z_{tB}^{glw} = max\left(W(1)_{tB}^{glw} - P(5)_{tB,max}^{glw}, 0\right)$

and $Z_{tB}^{gl} = \sum_{w} Z_{tB}^{glw}$ (Eq 48)

Theoretical capacity for workers is: $Y_{tB}^{glw} = max\left(P(5)_{tB,max}^{glw} - W(1)_{tB}^{gl}, 0\right)$ (Eq 49)

In practice there may be less capacity than indicated by equation 49 since the sum of the maxima for the two working status groups could in theory be greater than the available population. However since adjustments have already been made to the workforce demanded by gender and age group, balanced estimates of workforce by gender, age and working status can be calculated as:

$$W_{tB}^{glw} = W(1)_{tB}^{glw} - Z_{tB}^{glw} + min\left(Y_{tB}^{glw}, Z_{tB}^{gl}\right) \quad \text{(Eq 50)}$$

And a revised set of employment rates:

$$\sigma_{tB}^{glw} = \frac{W_{tB}^{glw}}{P_{tB}^{gl}} \quad \text{(Eq 51)}$$

ALLOCATIONS OF WORKERS TO ZONES

Required data:

Workers to be accommodated in the balancing area are: W_{tB}^{glw} from equation 50.

Initial estimates of workers in the balancing area are $P(3)_{tB}^{glw}$ - from equation 36

Adjustment required to initial estimates to match demand: $W_{tB}^{glw} - P(3)_{tB}^{glw}$

The maximum number of workers in the balancing area is $P(3)_{tB,max}^{gl}$ from equation 41, with separate estimates of the maximum number of workers by status $P(5)_{tB,max}^{glw}$ being available from equation 43.

Maximum adjustment to initial estimates that is possible is then $P(4)_{tB,max}^{glw} - P(3)_{tB}^{glw}$

There are two possible cases:

- the workforce demanded is a greater proportion of the population than in the previous scenario (expected to be the norm), ie $W_{tB}^{glw} \geq P(3)_{tB}^{glw}$; or

- the workforce demanded is a smaller proportion of the population than in the previous scenario, ie $W_{tB}^{glw} < P(3)_{tB}^{glw}$

If the proportion of the population required to work is less than in the previous population (ie $W_{tB}^{glw} < P(3)_{tB}^{glw}$) the initial estimates can be scaled back and:

$$W_{ti}^{glw} = \frac{W_{tB}^{glw}}{P(3)_{tB}^{glw}} P(3)_{ti}^{glw}$$

If the proportion of population working has increased then the employment rate lies somewhere between the initial and the maximum employment rate:

$$P(3)_{tB}^{glw} \le W_{tB}^{glw} \le P(5)_{tB,max}^{glw}$$

and the proportion of the possible adjustment that is required is:

$$\tau_{tB}^{glw} = \frac{W_{tB}^{glw} - P(3)_{tB}^{glw}}{P(5)_{tB,max}^{glw} - P(3)_{tB}^{glw}}$$

the zonal forecasts of workers by zone are calculated as:

$$W_{ti}^{glw} = P_{ti}^{glw} = P(3)_{ti}^{glw} + \tau_{tB}^{glw}\left(P(5)_{ti,max}^{glw} - P(3)_{ti}^{glw}\right)$$

These two cases can be combined into the single equation:

$$W_{ti}^{glw} = min\left(1, \frac{W_{tb}^{glw}}{P(3)_{tB}^{glw}}\right) P(3)_{ti}^{glw} + max\left(\tau_{tB}^{glw}, 0\right)\left(P(5)_{ti,max}^{glw} - P(3)_{ti}^{glw}\right) \quad \text{(Eq 52)}$$

with the total number of workers being $W_{ti}^{gl} = \sum_{w} W_{ti}^{glw}$

NON WORKERS BY ZONE

The non working population is the difference between the workers and total population and the split between students and others is assumed to remain as in the previous scenario.

$$N_{ti}^{glw} = \left(P_{ti}^{gl} - W_{ti}^{gl}\right) \frac{N_{(t-1)i}^{glw}}{N_{(t-1)i}^{gl}} \text{ for w=S,O} \quad \textbf{(Eq 53)}$$

UPDATE EMPLOYMENT FORECASTS FOR CHANGE IN WORKER PROFILE

The input employment data by sector is obtained by aggregation across the gender and working status groups:

$$E_{ti}^{a} = \sum_{gw} \tilde{E}_{ti}^{agw}$$

The revised split is then estimated as:

$$E_{ti}^{agw} = E_{ti}^{a} \frac{\tilde{E}_{ti}^{agw} \sum_{l} W_{tB}^{glw} \Big/ \sum_{l} \tilde{W}_{tB}^{glw}}{\sum_{gw} \left(\tilde{E}_{ti}^{agw} \sum_{l} W_{tB}^{glw} \Big/ \sum_{l} \tilde{W}_{tB}^{glw} \right)}$$ **(**Eq 54**)**

Appendix F Employment Forecasting Methodology

The material in this Appendix has been provided by the Department for Transport.

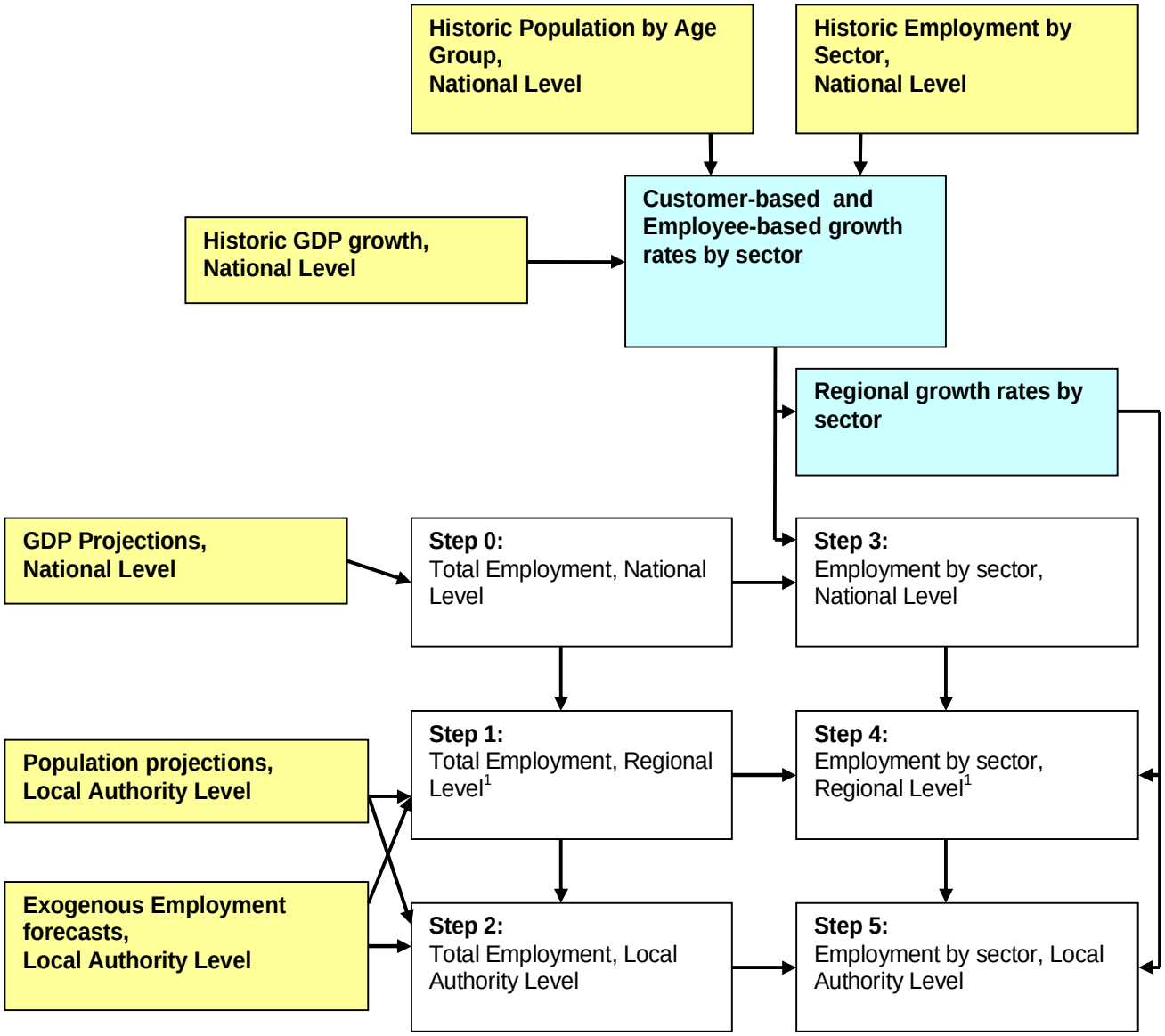
The NTEM Employment forecasting methodology was developed by the Department for Transport as part of the development of NTEM 6.1 following a review of the exogenous employment forecasts in earlier NTEM datasets. It has been modified slightly for NTEM 6.2. The advantages of the new methodology are:

- that it is constrained to employment growth consistent with HM Treasury projections of Gross Domestic Product (GDP), and can easily be updated in line with new GDP projections;
- that it provides a stable forecast of employment in each employment sector.

Figure F.1 on the next page provides an overview of the steps involved in the process. Broadly speaking:

- steps 0 to 2 forecast total employment across all sectors, first nationally (based on GDP), then progressively across smaller areas by combining population projections and exogenous employment forecasts;
- steps 3 to 5 forecast employment by sector, using population and GDP data and growth rates based on historic data for a 24 year period.

The outputs from the methodology were carefully reviewed prior to inclusion in NTEM 6.2 to ensure that the results were realistic. The methodology may be subject to further updates in future versions of the NTEM dataset.



[1]It should be noted that, strictly speaking, "Regional" means NTEM study area. This is consistent with the definition of Regions in Great Britain, except for London, South East and East. These last three regions are combined as a single study area, Wider South East.

Figure F.1 Overview of the NTEM 6.1 Employment Forecasting Method

GENERAL NOTATION

The following style of notation is used throughout:

$EN^{.Y}$ is used to denote NTEM National Employment for year Y. This is calculated in **Step 0**, using a simple calculation based on GDP forecasts.

$ER_{r}^{.Y}$ is used to denote NTEM Regional Employment for Region r and Year Y. This is calculated in **Step 1**, by combining exogenous employment forecasts with trends in population growth.

$EA_{a}^{.Y}$ is used to denote NTEM Employment by Local Authority, for Local Authority a and Year Y. This is calculated in **Step 2**, using a trivial extension of Step 1.

$EN_{.s}^{.Y}$ is used to denote NTEM National Employment for year Y and sector s. This is calculated in **Step 3**, by combining two alternative forecasts based on different assumptions.

$ER_{r.s}^{.Y}$ is used to denote NTEM Regional Employment for Region r, Year Y and employment sector s. This is calculated in **Step 4**, and uses the iterative proportional fitting (Furnessing) method, using $EN_{.s}^{.Y}$ and $ER_{r}^{.Y}$ as constraints.

$EA_{a.s}^{.Y}$ is used to denote NTEM Employment by Local Authority, for Local Authority a, Year Y and employment sector s. This is calculated in **Step 5**, and uses the iterative proportional fitting (Furnessing) method, using $ER_{r.s}^{.Y}$ and $EA_{a}^{.Y}$ as constraints.

The final NTEM employment forecasts are obtained by combining other employment forecasts, based on different assumptions. These different employment forecasts are represented as the first part of the superscript. The different forecasts used are as follows:

E **E**xogenous Employment

P Employment based on working age **P**opulation

C **C**ustomer-based forecast

W **W**orkforce-based forecast

L **L**ocal growth forecast

In the event, the P (employment based on working age population) forecasts were not used in NTEM 6.2, but the capability to use them has been retained should this be needed in the future.

So, for example:

$EA_a^{E.Y}$ represents **E**xogenous Employment (total over all sectors), for Local Authority a and year Y.[1] This can be aggregated into Regional level ($ER_r^{E.Y}$ for each region r) or national level ($EN^{E.Y}$).

$ER_r^{P.Y}$ represents **P**opulation-based Employment (total over all sectors) for region r and year Y.

$EN_{.s}^{C.Y}$ represents a **C**ustomer-based employment forecast for year Y and employment sector s. This is only used at a national spatial level.

$EN_{.s}^{W.Y}$ represents a **W**orkforce-based employment forecast for year Y and employment sector s. This is only used at a national spatial level.

$ER_{r.s}^{L.Y}$ represents a **L**ocal-data-based employment forecast, for Region r, year Y and employment sector s.

$EA_{a.s}^{L.Y}$ represents a **L**ocal-data-based employment forecast, for Local Authority a, year Y and employment sector s.

It should be noted that, in fact, this calculation is carried out separately for employment by gender (male/female) and work status (full time/ part time). However, for simplicity, we have not included separate superscripts for these categories.

In the base year, 2001, the employment by gender, work status and, where appropriate, by sector and Local Authority, is consistent with a common set of control totals, ie for base year B:

$$EN^{.B} = EN^{E.B} = EN^{P.B}$$

$$EN_{.s}^{.B} = EN_{.s}^{C.B} = EN_{.s}^{W.B}$$

$$EA_{a.s}^{.B} = EA_{a.s}^{L.B}$$

Each of the six steps (0 to 5) is described in turn. Other parameters required to carry out the calculation are introduced as required.

[1] This uses data supplied by Experian Business Strategies in 2009. In NTEM 6.2 this is controlled to the 2001 data from TEMPRO 6.0, which was based on the 2001 Census.

STEP 0: TOTAL EMPLOYMENT, NATIONAL LEVEL

Total employment for year Y, at a National level, is calculated from the previous year Y-1 by:

$$EN^{\cdot Y} = EN^{\cdot Y-1} \times g_N^{E.Y-1.Y}$$

where:

$g_N^{E.Y-1.Y}$ is the growth rate in employment from the previous year.

For years up to 2015, this is derived from historic data and Office for Budget Responsibility forecasts. For years from 2016 onwards, this is calculated from long-term GDP and productivity forecasts provided by the Treasury, using the following formula:

$$g_N^{E.Y-1.Y} = \frac{g_N^{G.Y-1.Y}}{g_N^{R.Y-1.Y}}$$

Where:

$g_N^{G.X.Y}$ is growth in GDP (in real terms) between year X and year Y.

$g_N^{R.X.Y}$ is growth in productivity per worker between year X and year Y.

The standard Treasury assumption is that productivity per worker grows by 2% per year, ie:

$$g_N^{R.X.Y} = (1.02)^{(X-B)}$$

STEP 1: TOTAL EMPLOYMENT, REGIONAL (STUDY AREA) LEVEL

In Step 1, the total national employment $EN^{\cdot,Y}$ is disaggregated to produce total employment by Region, $ER_r^{\cdot,Y}$ for each Region r[2].

The spatial split of employment requires an exogenous employment forecast $ER_r^{E,Y}$ which is constructed with due consideration to the economic drivers of employment.[3] However, in general, the sum of these forecasts across all regions will not be the same as the total national employment calculated in Step 0, ie:

$$\sum_{r \in N} ER_r^{E,Y} \neq EN^{\cdot,Y}$$

whereas it is necessary that:

$$\sum_{r \in N} ER_r^{\cdot,Y} = EN^{\cdot,Y}$$

In NTEM 6.2 we used a simple approach to adjust the exogenous forecast by applying a global scaling factor, ie:

$$ER_r^{\cdot,Y} = ER_r^{E,Y} \times \frac{EN^{\cdot,Y}}{\sum_{r \in N} ER_r^{E,Y}} \ ,$$

However, we are aware that this approach can sometimes cause counterintuitive effects, with some Regions switching from growth to decline if the global NTEM employment total is very different to the global total for the exogenous forecast. The example on the next page illustrates this point.

For NTEM 6.2, it was decided to use this simple approach on the grounds that the following factor:

$$\frac{EN^{\cdot,Y}}{\sum_{r \in N} ER_r^{E,Y}}$$

remained very close to 1 (within the range 0.98 to 1.02) for all forecast years. However, had this not been the case, we would have considered combining the exogenous forecast with a second employment forecast based on growth in population aged 16 to 64, as was previously done in NTEM 6.1. Therefore, the employment forecasting program retains this flexibility should it be required in the future. This can be specified mathematically as follows:

$$ER_r^{\cdot,Y} = \lambda^Y (\alpha_E^Y ER_r^{E,Y} + \alpha_P^Y ER_r^{P,Y})$$

[2] London, South East and East regions were combined into a single "Region" for the purpose of this calculation.

[3] For NTEM 6.1, these forecasts were supplied by Experian Business Strategies [EBS] in November 2009. These were retained for NTEM 6.2, but the final NTEM employment forecast itself is not identical to the NTEM 6.1 forecast as it has been adjusted to take into account more recent GDP and population projections

Theoretically, the parameters λ^Y, α_E^Y and α_P^Y can vary by year, although in practice one of the parame*t*ers λ^Y, α_E^Y and α_P^Y is redundant.

By convention $\alpha_E^Y + \alpha_P^Y = 1$. In NTEM 6.2, $\alpha_E^Y = 1$ and $\alpha_P^Y = 0$ for all years Y.

The following example illustrates the counterintuitive result that can occur if λ^Y varies too much :

Example

Consider an example of employment forecasting between 2 years (eg 2001 and 2011) and three regions with the same level of population growth but differing levels of employment growth as follows:

Region number	Population aged 16 to 64		Exogenous Employment	
	2001	2011	2001	2011
1	100	110	50	60
2	100	110	50	75
3	100	110	50	90
Total	**300**	**330**	**150**	**225**

Consider what would happen if the "national" employment forecasts (total across all regions) were much lower, at 180 jobs in 2011. This would require a 20% reduction in employment overall. If this was applied as a common global reduction for all zones, the resulting employment would be as follows:

Region number	Population aged 16 to 64		Employment Forecast	
	2001	2011	2001	2011
1	100	110	50	48
2	100	110	50	60
3	100	110	50	72
Total	**300**	**330**	**150**	**180**

This would mean that employment growth in Region 1 would switch sign from positive to negative, simply because of a reduction in national employment without any consideration of other characteristics of the Region (including Population growth).

If employment in each Region were to grow in line with working age population, then each Region would have 55 jobs in 2011 (ie a total of 165 jobs). This is the "population-based" forecast. By scaling the difference between the exogenous and population-based forecast, a new forecast is produced as follows:

Region number	Population aged 16 to 64		Employment Forecast	
	2001	2011	2001	2011
1	100	110	50	56
2	100	110	50	60
3	100	110	50	64
Total	**300**	**330**	**150**	**180**

This means that the employment in Region 1 does not change sign simply because of the global change in employment, and the rank of growth is preserved (ie Regions with the greatest growth in the exogenous forecasts still have the greatest growth in this forecast, although the difference between the Regions is reduced).

It is also instructive to consider an example where the "national" employment growth is lower than ***both*** the population-based and exogenous forecasts. In this instance, the population-based and exogenous forecasts are combined in proportion with the "distance" of the total forecast from both the population-based and exogenous forecasts.

For example, if the 2011 "national" employment declined slightly to 145 jobs, the distance from the population-based forecast would be 20 and the distance from the exogenous forecast would be 80. The population-based and exogenous forecasts would be weighted by 80% and 20% respectively, and then a single scaling factor would be applied to match the total employment.

In this example:

- 80% of the population-based forecast would be 132 jobs
- 20% of the exongenous forecast would be 45 jobs;
- A scaling factor of 145/177 = 0.8192 would be applied to the weighted components.

The resulting employment by region would be as follows:

Region number	Population aged 16 to 64		Employment Forecast	
	2001	2011	2001	2011
1	100	110	50	46
2	100	110	50	48
3	100	110	50	51
Total	**300**	**330**	**150**	**145**

Again, this preserves the rank of employment by region, with Regions having the greatest growth in the exogenous forecast also having greatest growth (or least decline) in the final forecast.

It should be noted that this is an extreme example – usually, the GDP-based employment growth calculated in Step 0 would not be 20% lower than the exogenous forecast at a national level.

STEP 2: TOTAL EMPLOYMENT, LOCAL AUTHORITY LEVEL

This step calculates $EA_a^{\cdot Y}$ by combining:

- the exogenous forecast at Local Authority level, $EA_a^{E.Y}$;
- a population-based forecast at Local Authority level $EA_a^{P.Y}$;

using the same parameters λ, α_E and α_P generated in Step 1. In NTEM 6.2, $\alpha_E = 1$ and $\alpha_P = 0$.

Thus the formula for calculating $EA_a^{\cdot Y}$ is:

$$EA_a^{\cdot Y} = \lambda(\alpha_E EA_a^{E.Y} + \alpha_P EA_a^{P.Y})$$

However, there is a subtlety that should be considered here. At Local Authority level the spatial distribution of working age population is not a good indicator of the spatial distribution of employment. Therefore, the population-based employment for each Local Authority a, in each Region r, was calculated using the **Regional** population growth, as follows:

$$EA_a^{P.Y} = EA_a^{P.B} \times \frac{PR_r^Y}{PR_r^B} \text{ for each } a \in r$$

This means that:

$$\sum_{a \in r} EA_a^{P.Y} = \sum_{a \in r} EA_a^{P.B} \times \frac{PR_r^Y}{PR_r^B} = ER_r^{P.B} \times \frac{PR_r^Y}{PR_r^B} = ER_r^{P.Y}$$

and, given that also:

$$\sum_{a \in r} EA_a^{E.Y} = ER_r^{E.Y}$$

then:

$$\sum_{a \in r} EA_a^{\cdot Y} = ER_r^{\cdot Y}$$

STEP 3: EMPLOYMENT BY SECTOR, NATIONAL LEVEL

The split of NTEM employment by employment sector is based on historic growth relative to underlying population and GDP growth. This is done by constructing and combining two different forecasting approaches:

- customer-based forecasts – based on growth relative to the users of the services provided by each sector ("customers");
- workforce-based forecasts – based on growth relative to the working age population.

These are combined in such a way that the total employment across all sectors is consistent with the national employment total $EN^{\cdot Y}$ calculated in Step 0.

Both customer-based and workforce-based forecasts are calculated using a similar approach. Customer-based forecasts are calculated as follows:

$$EN_{.s}^{C.Y} = EN_{.s}^{C.B} \times U_{.s}^{B.Y} \times J_{.s}^{B.Y}$$

where:

B is the base year;

$U_{.s}^{B.Y}$ is the growth factor in underlying data between base year B and year Y for sector s. This can be total population, population within a certain age group or GDP. The category used varies by employment sector s.

$J_{.s}^{B.Y}$ is an additional growth factor based on annual growth rates between years B and Y. These annual growth rates are calibrated from the historic data by employment sector. This also varies by employment sector s.

Table F., on the next page, shows, for each employment sector:

- the data category used to calculate the underlying data growth factor $U_{.s}^{B.Y}$;
- the additional annual growth that was applied on top of the underlying data $J_{.s}^{B.Y}$. The short-term growth rates were applied between 2001 and 2011; the long term growth rates were applied for years between 2011 and 2041.

Table F.4: Customer categories and underlying growth

Employment Type and Description		Components of Growth Rates		
		Underlying Data Category used (Age group/GDP)	Additional Growth pa	
			Short-term	Long-term
E03	Education (School)	0 to 15	3.35%	1.08%
E04	Education (Higher)	16 to 29	1.08%	1.08%
E05	Education (Adult/Other)	16 to 64	1.08%	1.08%
E06	Hotels, campsites etc	16 and over	-0.56%	0.56%
E07	Retail	GDP	-2.58%	-1.93%
E08	Health & Medical	65 and over	1.46%	1.55%
E09	Services	16 and over	0.73%	1.05%
E10	Industry, Construction & Transport	16 and over	-1.31%	-1.45%
E11	Restaurants & Bars	GDP	-1.24%	-0.82%
E12	Recreation & Sport	GDP	-1.02%	-0.26%
E13	Agriculture, etc	Population	-2.34%	-1.78%
E14	Business	GDP	-0.29%	-0.42%

Initial examination of the method suggested that in some categories, there had been an unusually high level of growth in recent years that would not be expected to continue far into the future. This necessitated the use of short-term growth rates and long-term growth rates:

- short-term growth rates were calibrated from historic employment growth between 1996 and 2006 and population growth between 1996 and 2006);

- long term growth rates were calibrated from historic employment growth between 1982 and 2006 and population growth between 1981 and 2006.

The three Education categories were an exception to this, as the historic employment data only gave the total for all three Education categories. The parameters were developed on the assumption that the 1986-1996 overall additional growth in Education employment would be applied to:

- all three categories in the long term forecasts;
- categories E04 and E05 in the short term forecasts.

Overall growth in the short term forecasts was based on 1996-2006 data, with the remainder of the growth taken by E03. This was compared with a Statistical Release from the Department for Children, Schools and Families (DCSF), 29 September 2009. This only reports education employment in state schools and so could not be used to calibrate a direct growth rate, but the growth rate above in above appeared sensible in comparison with this Statistical Release.

Workforce-based forecasts are calculated in a similar way:

$$EN_{.s}^{W.Y} = EN_{.s}^{W.B} \times \frac{PN^{Y}}{PN^{B}} \times K_{.s}^{B.Y}$$

where:

B is the base year;

PN^{Y} is national working-age population, hence $\frac{PN^{Y}}{PN^{B}}$ is growth in working age population between the base year B and year Y.

The factor $\frac{PN^{Y}}{PN^{B}}$ is analogous to $U_{.s}^{B.Y}$ in the customer-based forecasts;

$K_{.s}^{B.Y}$ is an additional growth factor calibrated from the historic data by employment sector. This is analogous to $J_{.s}^{B.Y}$ in the customer-based forecasts. These factors vary by employment sector s.

Table F. on the next page shows the additional growth factors $K_{.s}^{B.Y}$ for the workforce-based forecasts. As with the customer-based forecasts, these are split into short-term and long-term, with short-term rates being applied between 2001 and 2011, and long-term rates being applied between 2011 and 2041.

Different growth rates apply to the three education categories as the growth in these categories is expected to be driven by the students rather than the workforce. The short term additional growth for category E03 was calculated in the same way as for the customer-based forecast, by assuming that the short-term additional growth for E04 and E05 is constrained to be the same as the long-term additional growth.

Table F.5: Employee categories and underlying growth

Employment Type and Description		Components of Growth Rates		
		Underlying Data Category used (Age group)	Additional Growth pa	
			Short-term	Long-term
E03	Education (School)	16 to 64	2.52%	1.27%
E04	Education (Higher)	16 to 64	-0.18%	-0.18%
E05	Education (Adult/Other)	16 to 64	1.08%	1.08%
E06	Hotels, campsites etc	16 to 64	-0.59%	0.58%
E07	Retail	16 to 64	-0.44%	0.29%
E08	Health & Medical	16 to 64	1.30%	1.66%
E09	Services	16 to 64	0.70%	1.07%
E10	Industry, Construction & Transport	16 to 64	-1.34%	-1.43%
E11	Restaurants & Bars	16 to 64	0.93%	1.43%
E12	Recreation & Sport	16 to 64	1.16%	2.00%
E13	Agriculture, etc	16 to 64	-2.56%	-1.91%
E14	Business	16 to 64	1.91%	1.64%

The approach to combining the customer-based and workforce-based forecasts is the same approach as used for combining the exogenous forecasts and the population-based forecasts in Step 1. The NTEM employment for employment sector s in year Y, $EN_{.s}^{Y}$ was calculated as a weighted average of $EN_{.s}^{C.Y}$ and $EN_{.s}^{W.Y}$ as follows:

$$EN_{.s}^{Y} = \mu^{Y}\left(\frac{d^{W.Y}EN_{.s}^{C.Y} + d^{C.Y}EN_{.s}^{W.Y}}{d^{W.Y} + d^{C.Y}}\right)$$

where:

$d^{C.Y}$ This is the absolute "distance" of the **C**ustomer employment forecasts, aggregated over all sectors, from $EN^{.Y}$, ie:

$$d^{C.Y} = \left|\sum_{s} EN_{.s}^{C.Y} - EN^{.Y}\right|$$

This is defined separately for each year Y, but is only ever required at national spatial area level N.

$d^{W.Y}$ This is the absolute "distance" of the **W**orkforce-based employment forecast from $EN^{.Y}$, ie:

$$d^{W.Y} = \left|\sum_{s} EN_{.s}^{W.Y} - EN^{.Y}\right|$$

μ^{Y} is a scaling parameter to ensure that $EN^{.Y} = \sum_{s} EN_{.s}^{Y}$. It is analogous to λ^{Y} in Step 1.

STEP 4: EMPLOYMENT BY SECTOR, REGIONAL LEVEL

There are two stages to obtaining employment by Region and employment sector:

Stage 1: update the base year employment to reflect appropriate growth in customers or working age population (depending on employment sector);

Stage 2: adjust the matrix to ensure that it is consistent with **BOTH**:

- the forecast employment by Region (from Step 1); **AND**
- the forecast employment by Sector (from Step 3).

Stage 2 is carried out using an iterative proportional fitting (Furnessing) procedure.

In **Stage 1**, growth is applied to the employment for each Region and Sector in a similar way to that used for the Customer-based and Employee-based forecasts in Step 3. This does not form the final forecast - it simply provides a more up-to-date basis for the Furnessing procedure in Stage 2.

The forecasts for Stage 1 of this process are calculated as follows:

$$ER_{r.s}^{L.Y} = ER_{r.s}^{.B} \times VR_{r.s}^{B.Y} \times M_{.s}^{B.Y}$$

where:

B is the base year;

$VR_{r.s}^{B.Y}$ is the growth factor in underlying data between base year B and year Y for Region r and employment sector s. This can be total population, population within a certain age group or GDP. The underlying data category used varies by employment sector s. This is analogous to $U_{.s}^{B.Y}$ in the customer-based forecasts.

$M_{.s}^{B.Y}$ is an additional growth factor calibrated from the historic data by employment sector. This also varies by employment sector s. This is analogous to $J_{.s}^{B.Y}$ and $K_{.s}^{B.Y}$ in the customer-based and workforce-based forecasts respectively.

Table F.6, on the next page, shows, for each employment sector:

- the data category used to calculate the underlying data growth factor $VR_{r.s}^{B.Y}$. The data category is either:
  - the customer-based category, where the customers are likely to reside near the employment;
  - the employee-based category (ie population aged 16 to 64), where the customers are not likely to reside near the employment;
  - where the customer-based category should be used **and** the customer-based category is GDP, a suitable population category is be used as a proxy;
- the forecast employment by Sector (from Step 3);
- the additional annual growth that was applied on top of the underlying data $M_{.s}^{B.Y}$. The short-term growth rates were applied between 2001 and 2011; the long term growth rates were applied for years between 2011 and 2041.

Table F.6: Regional employment categories and underlying growth

Employment Type and Description		Customer/ Employee Forecast used	Components of Growth Rates		
			Underlying Data Category used (Age group/GDP)	Additional Growth pa	
				Short-term	Long-term
E03	Education (School)	Customer	0 to 15	3.35%	1.08%
E04	Education (Higher)	Customer	16 to 29	1.08%	1.08%
E05	Education (Adult/Other)	Customer	16 to 64	1.08%	1.08%
E06	Hotels, campsites etc	Employee	16 to 64	-0.59%	0.58%
E07	Retail	Customer	Population	-0.21%	0.43%
E08	Health & Medical	Customer	65 and over	1.46%	1.55%
E09	Services	Customer	16 and over	0.73%	1.05%
E10	Industry, Construction & Transport	Customer	16 and over	-1.31%	-1.45%
E11	Restaurants & Bars	Customer	16 and over	0.96%	1.41%
E12	Recreation & Sport	Customer	Population	1.39%	2.14%
E13	Agriculture, etc	Employee	16 to 64	-2.56%	-1.91%
E14	Business	Employee	16 to 64	1.91%	1.84%

Stage 2 is carried out using the biproportioning, or Furnessing, procedure[4]. The following two steps are repeated alternately:

- a single factor is applied to all the jobs in the matrix for each employment sector (each "column") in order to match the employment sector totals – this is called the "column balance";
- a single factor is applied to all the jobs in the matrix for each Region (each "row"), in order to match the regional totals – this is called the "row balance";

until the results of successive row balances are identical within a defined tolerance level.

Mathematically this can be represented as follows. For each region r:

$$ER_{r.s}^{Y(0,2)} = ER_{r.s}^{L.Y}$$

Then for n=1,2,3…, two new employment forecasts are constructed as follows:

$$ER_{r.s}^{Y(n,1)} = ER_{r.s}^{Y(n-1,2)} \times \frac{EN_{s}^{.Y}}{\sum_{r} ER_{r.s}^{Y(n-1,2)}}$$

(Factor to national totals by sector [column balance])

$$ER_{r.s}^{Y(n,2)} = ER_{r.s}^{Y(n,1)} \times \frac{ER_{r}^{.Y}}{\sum_{s} ER_{r.s}^{Y(n,1)}}$$

This Furnessing procedure reaches a tight tolerance level in very few iterations.

[4] The Furnessing procedure is frequently used in transport planning to adjust origin-destination matrices to match vectors of origins and destinations

STEP 5: EMPLOYMENT BY SECTOR, LOCAL AUTHORITY LEVEL

Step 5 is carried out in a very similar way to Step 4, but at a greater level of spatial detail:

Stage 1: update the base year employment to reflect appropriate growth in customers or working age population (depending on employment sector);

Stage 2: adjust the matrix to ensure that it is consistent with **BOTH**:

- the forecast employment by Local Authority (from Step 2);

  AND

- the forecast employment by Region and Sector (from Step 4).

As with Step 4, Stage 2 is carried out using an iterative proportional fitting (Furnessing) procedure.

The forecasts for Stage 1 of this process are calculated as follows:

$$EA_{a.s}^{L.Y} = EA_{a.s}^{.B} \times VA_{a.s}^{B.Y} \times M_{.s}^{B.Y}$$

where:

B is the base year;

$VA_{a.s}^{B.Y}$ is the growth factor in underlying data between base year B and year Y for Local Authority a and sector s. The underlying data categories used are exactly the same as for Step 4, except that in Step 5 they are at Local Authority Level rather than Regional Level.

$M_{.s}^{B.Y}$ is defined in the same way as in Step 4.

As with Step 4, **Stage 2** is carried out using the biproportioning, or Furnessing, procedure, but this time at a greater level of spatial detail. The following two steps are repeated alternately:

- a single factor is applied to all the jobs in the matrix for each employment sector (each "column") in order to match the employment sector totals – this is called the "column balance";
- a single factor is applied to all the jobs in the matrix for each Region (each "row"), in order to match the regional totals – this is called the "row balance";

until the results of successive row balances are identical within a defined tolerance level.

Mathematically this can be represented as follows. For each Local Authority a in each Region r:

$$EA_{a.s}^{.Y(0,2)} = EA_{a.s}^{L.Y}$$

Then for n=1,2,3…, two new employment forecasts are constructed as follows:

$$EA_{a.s}^{.Y(n,1)} = EA_{a.s}^{.Y(n-1,2)} \times \frac{ER_{r,s}^{.Y}}{\sum_{a \in r} EA_{a.s}^{.Y(n-1,2)}}$$

(Factor to Regional totals by sector [column balance])

$$EA_{a.s}^{.Y(n,2)} = EA_{a.s}^{.Y(n,1)} \times \frac{EA_{a}^{.Y}}{\sum_{s} EA_{a.s}^{.Y(n,1)}}$$